Brazil: Framework Analysis for Public–Private Partnerships in Irrigation

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Daniele La Porta Arrobas
José Virgilio Lopes Enei

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Sustainable Development Department
This report was prepared under the direction of Musa Asad (Senior Financial Analyst, SASAD), Jennifer Sara (Sector Leader LCC5C) and Manuel Contijoch (Senior Water Resources Specialist LCSSD). The coordination of the report was done by Daniele La Porta Arrobas (Irrigation & PPP Sp, LCSEN), with the collaboration of a group of core team members and consultants, including Alberto Ninio (Lead Attorney, LEGLA), Elmar Wagner (Agronomist), José Virgilio Lopes Enei (Attorney), Larry Simpson (Water Resources Management Specialist), Octavio Damiani (Economist), Paula Freitas (Operations Analyst, LCC5C), Luiz Gabriel Azevedo (Sector Leader, LCC5C) and Ronaldo Seroa da Mota (Economist) without whose support and hard work the results summarized here would not have been possible. This activity was funded by a grant from the Public Private Infrastructure Advisory Facility - PPIAF and undertaken by the Environment and Water Resources Sustainable Development Department of the Latin America and Caribbean Region of the World Bank.

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Additional copies may be obtained from Amanda Schneider (aschneider1@worldbank.org or tel. 202-473-3092).
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<td>ANA</td>
<td>Agência Nacional de Águas (National Water Agency)</td>
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<td>APU</td>
<td>Agricultural Production Unit</td>
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<td>BGL</td>
<td>Budget Guidelines Law</td>
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<td>BL</td>
<td>Budget Law</td>
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<td>BNB</td>
<td>Banco do Nordeste (Bank of the Northeast)</td>
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<td>BNDES</td>
<td>Banco Nacional de Desenvolvimento Econômico e Social (National Bank for Economic and Social Development)</td>
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<td>BOT</td>
<td>Build, Operate and Transfer</td>
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<tr>
<td>CDRU</td>
<td>Concessão de Direito Real de Uso (Concession of Right in Rem to Use)</td>
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<td>CF</td>
<td>Conversion Factors</td>
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<td>CNPq</td>
<td>Conselho Nacional de Desenvolvimento Científico e Tecnológico (National Council for Scientific and Technological Development)</td>
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<td>CODEMIG</td>
<td>Companhia de Desenvolvimento Econômico de Minas Gerais (Minas Gerais Development Company)</td>
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<td>CODEVASF</td>
<td>Companhia de Desenvolvimento dos Vales do São Francisco e Parnaíba (São Francisco and Parnaíba Valleys Development Company)</td>
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<tr>
<td>CONAB</td>
<td>Companhia Nacional de Abastecimento (National Supply Company)</td>
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<td>CONAMA</td>
<td>Conselho Nacional do Meio Ambiente (National Environment Council)</td>
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<td>CUI</td>
<td>Common-Use Infrastructure</td>
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<td>CVM</td>
<td>Companhia de Valores Mobiliários (Securities Commission)</td>
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<td>DNOCS</td>
<td>Departamento Nacional de Obras Contra as Secas (National Department for Drought Relief Works)</td>
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<td>EIRR</td>
<td>Economic Internal Rate of Return</td>
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<td>EMBASA</td>
<td>Empresa Baiana de Águas e Saneamento (Water and Sanitation Company of Bahia)</td>
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<td>EMBRAPA</td>
<td>Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Company)</td>
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<td>EMBRATER</td>
<td>Empresa Brasileira de Assistência Técnica e Extensão Rural (Brazilian Agency for Technical Assistance and Rural Extension)</td>
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<td>ERR</td>
<td>Economic Rate of Return</td>
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<td>ESW</td>
<td>Economic and Sector Work</td>
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<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GoB</td>
<td>Government of Brazil</td>
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<td>IBAMA</td>
<td>Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (Brazilian Institute of Environment and Renewable Natural Resources)</td>
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<td>IBRAF</td>
<td>Instituto Brasileiro de Frutas (Brazilian Fruit Institute)</td>
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<tr>
<td>IBRD</td>
<td>International Bank for Reconstruction and Development</td>
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<td>ICMS</td>
<td>Imposto sobre Circulação de Mercadorias e Prestação de Serviços (State Tax on Goods and Services)</td>
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<td>ID</td>
<td>Irrigation District</td>
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<td>IDB</td>
<td>Inter-American Development Bank</td>
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<td>HDI</td>
<td>Human Development Index</td>
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<td>IFC</td>
<td>International Finance Corporation</td>
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<td>Insurance-Guarantee Fund</td>
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<td>Índice Geral de Preços de Mercado (Overall Index of Market Prices)</td>
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<td>Instituto de Pesquisa Agropecuária (Agricultural Research Institute)</td>
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<td>IPEA</td>
<td>Instituto de Pesquisa Econômica Aplicada (Institute for Applied Economic Research)</td>
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<td>IRR</td>
<td>Internal Rate of Return</td>
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<td>MG</td>
<td>State of Minas Gerais</td>
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<td>MIN</td>
<td>Ministry of National Integration</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>MIGA</td>
<td>Multilateral Investment Guarantee Agency</td>
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<td>NEAD</td>
<td>Núcleo de Estudos Agrários e Desenvolvimento Rural (Center for Agrarian Studies and Rural Development)</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>NMCI</td>
<td>Novo Modelo Conceitual de Irrigação (New Conceptual Irrigation Model)</td>
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<tr>
<td>NPV</td>
<td>Net Present Value</td>
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<td>NSPV</td>
<td>Net Social Present Value</td>
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<td>O&amp;M</td>
<td>Operation and Maintenance</td>
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<td>PPP Guarantor Fund</td>
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<td>Public Irrigation Perimeters</td>
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<td>PMC</td>
<td>PPP Management Committee</td>
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<td>Plano Plurianual de Investimentos (GoB Multiannual Investment Plan)</td>
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<td>Public–Private Infrastructure Advisory Facility</td>
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<td>PPP</td>
<td>Public–Private Partnership</td>
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<td>PROFIR</td>
<td>Programa de Financiamento da Irrigação (Irrigation Financing Program)</td>
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<td>PROVÁRZEA</td>
<td>Projeto Manejo dos Recursos Naturais da Várzea (Project for the Management of Floodplain Natural Resources)</td>
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<td>PR</td>
<td>Permanent Reserve</td>
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<td>SBU</td>
<td>Strategic Business Unit</td>
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<td>SPE</td>
<td>Special purpose entity</td>
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<td>SRD</td>
<td>Sustainable Rural Development</td>
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<tr>
<td>SUDENE</td>
<td>Superintendência de Desenvolvimento do Nordeste (Northeast Development Agency)</td>
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Executive Summary

Irrigated agriculture is expected to play an important role as a means of addressing the need for food, fiber and bioenergy stemming from both ongoing population growth and increased incomes.

Brazil’s irrigation is a key instrument for the promotion of the economic and social development of the poorest areas of the country in the Northeast and Semi-Arid Regions, where the rational use of water is critical for fostering sustainable development with social inclusion.

This development, which is boosted by irrigation, may bring about a substantial increase in the human development indexes of poor local communities. Opportunities for finding well-paying jobs for these communities will also greatly increase. The entire region will benefit through the reduction of rural migration, the development of professional skills, and the integration of small farmers into the agribusiness chain. For the country as a whole, there will be a net benefit in the increase of exports, tax collection, better income distribution, and a reduction in regional inequalities.

The purpose of this report is to discuss the Brazilian legal and institutional framework for implementing irrigation projects under Public-Private Partnerships. It highlights options, procedures and models for such partnerships, aiming at the development and improvement of the institutions involved, and the planning and operation of partially implemented large and medium-scale public irrigation perimeters. The paper also submits recommendations on the next steps for the implementation of these projects based on a series of discussions held during workshops and meetings.

Background

Irrigation in Brazil has unique, specific characteristics compared to other countries, ranging from institutional, technical, and financial, to social and economic aspects. From an institutional perspective, irrigation systems in Brazil are predominantly private (over 90 percent), drawing water directly from rivers, lakes, and dams.

Unlike Latin American countries with vast arid regions, such as Mexico, Peru, Chile, and Argentina, which have a century-long tradition of irrigated agriculture, the Brazilian Semi-Arid Region experience with public investments is very recent, based on projects dating back to the early 1970s.

The experience of Public Irrigation Projects (PIPs) in Brazil is mixed. The objectives of the first implemented PIPs were highly social, exclusively benefiting the region’s traditional small-scale producers. However, they lacked the necessary managerial, technological, and financial capacity to make adequate use of the full potential of irrigation techniques. The involvement of entrepreneurial producers in projects first started in the 1980s, following the results of private sector investment in irrigation, and led to a new orientation in irrigated agriculture, promoting the establishment of some of the country’s most important agribusiness hubs. The Petrolina-Juazeiro hub, in the São Francisco River Valley, is a good example of this process. Its successful and rapid transformation into a dynamic fruit export center contributed to changing the strategy of public irrigation and to the development of agribusiness, thereby promoting an accelerated expansion of private irrigated agriculture in the Semi-Arid and in the Northeast Region.

There are currently about 1 million hectares with PIPs that are underutilized, and a substantial number of irrigation projects has been identified that could benefit from the accelerated development of PPPs in the irrigation sector in Brazil.
Legal and Institutional Framework

Decree No. 89,496/84, which regulates the Irrigation Bill (“Regulating Decree”), defines an irrigation project as “the set of planning, execution, administration, operation and maintenance activities aimed at the agricultural use of water and soil resources within a certain area” (Sec. 8, §1).

The Irrigation Bill defines both public and private irrigation. It also proposes a third category—the Mixed Irrigation Project—defined as a project executed and implemented in accordance with Law No. 11,079/04, which establishes the public–private partnership scheme–PPP (Sec. 12, sole paragraph).

Although the Irrigation Bill has the merit of recognizing the specifics of irrigation projects carried out under the PPP scheme by means of an independent category, such projects may also be classified as types of Public Projects, according to the terms of the Irrigation Bill, since the implementation and operation of irrigation infrastructure are in the hands of the private partner who acts as a concessionaire of a public service, i.e., as the mere executor of the service whose title is held by the Granting Authority.

Greater attention is therefore given to Public Irrigation Projects, including the Mixed Projects subtype, as described by the Irrigation Bill. They are directly aimed at social and economic development, which constitutes an important mission of the State.

The drafting and implementation of the National Irrigation Policy is the responsibility of the Ministry of National Integration, the successor of the Ministry of the Interior, according to Law No. 10,683/03, which governs the organization of the Office of the President of the Republic and its Ministries (Sec. 27, XIII, “j”).

CODEVASF, which is affiliated with the Ministry of National Integration, is responsible for the implementation of the National Irrigation Policy, among other tasks, in accordance with the guidelines set forth by the Ministry of National Integration.

The Legal and Institutional framework for public irrigation projects is well defined and planned. The possibility of promoting these services under the PPP modality is also foreseen in the present legal framework.

Legal and Regulatory Framework for Public–Private Partnership

With the shortage and competition for public funds, and the mixed results of PIPs, the PPPs provide a strong incentive for attracting a new wave of private investments in projects with public interest, especially in the infrastructure sector. Such projects would otherwise not be economically feasible or would be relegated to action by the State, depending on the availability of rather scarce budget allocations.

PPPs are a response to the limitations noted in traditional investment schemes through collaboration between the State and the private sector (concessions, permits, authorizations, and bidding for public works). Studies were carried out, culminating in the submission to the Chamber of Deputies of a bill proposed by the Executive Branch and championed by the Ministry of Planning on November 19, 2003. This bill became Federal Law No. 11.079/04.
The PPP contract usually considers the execution of a public work or the provision of goods as a stage prior to the provision of the service. However, the execution of the work or provision of the good may not constitute the PPP’s sole purpose (PPP Law, Sec. 2, §4, III), nor its final objective, but rather an intermediate activity which is incidental to the final objective, i.e., irrigation service.

Any Public–Private Partnership must be preceded by bidding in the form of competition (PPP Law, Sec. 10). Prior to its publication, the Invitation to Bid must undergo public consultation for the receipt of comments from interested parties and society in general.

The selection of bids may use as a criterion: (i) the lowest value of the public counterpayment; or (ii) the best bid in terms of the combination of the criterion of lowest counterpayment with best technical proposal, in accordance with weights set forth in the invitation to bid (PPP Law, Sec. 12, II).

In the case of a PPP in the irrigation sector, the Specific Purpose Entity (SPE), established by the private partner, shall be in charge of providing the public service of supplying water for irrigation and of O&M for the CUI, acting as concessionaire and obtaining part of its remuneration through fees charged to users of this service (agricultural anchors and their integrated rural producers and other water users), and another portion through public counterpayment.

This public counterpayment, which reduces the risks of service demand/market and supply, price fluctuation, fee level, and noncompliance by users, is a mechanism for guaranteeing the sustainability of the service under concession.

In accordance with Section 8 of the PPP Law, the financial obligations agreed to by the Public Administration in PPP contracts may be guaranteed by means of: (i) linkage of future public revenues; (ii) contracting of insurance-guarantee with private insurance companies, depending on the availability of such coverage in the market (Public Authority default); (iii) guarantees provided by international agencies, including political risk insurance; (iv) guarantees provided by a private financial institution, including a bank bond or similar; and (v) guarantees provided by a guarantor fund or state enterprise created for this purpose;

Due to the restrictions, costs, and unavailability of market coverage noted in several of the aforementioned types of guarantees, the Guarantor Fund (PGF) was created by Decree No 5,411/05 as the key guarantee instrument to support the federal PPP program. The PGF was conceived as a private fund, with shares committed by the Federal Government and other public entities, resembling any other type of investment fund. In addition to guarantor funds, state PPP programs include state enterprises constituted for or adapted to the provision of such guarantees.

**PPP Models for the Irrigation Sector**

Based on the most recent studies, and especially on the successful experience of a handful of PPPs projects that achieved better results, it is acknowledged that public irrigation projects cannot do without the participation of agribusiness companies that can introduce more modern, efficient irrigated farming techniques, benefit from economies of scale, join the agro-industrial chain as a means of adding value to agricultural products, develop efficient distribution channels, access worldwide consumer markets, and obtain credit and financing at viable, competitive costs.

As is recognized by the Irrigation Law and by the Irrigation Bill, the implementation of Public Irrigation Projects aimed at agribusiness companies serve the public interest, as long as such a
configuration, according to the characteristics of each project, shows itself to be more apt to promote the economic and social development of the respective regions and their populations.

Even the social concern about small local farmers may be addressed through the generation of direct and indirect jobs, or through their integration in the productive chain of agribusiness companies, so that they can thus act as anchors of integration.

Three PPP models were identified based on these assumptions: (i) Dual Model: Sponsored PPP combined with CDRU; (ii) Vertical Model; and (iii) Administrative PPP. The adoption of any of these models is defined based on several criteria such as: project size and location; regional and local agricultural vocation; required investments and social scenario.

**Economic Criteria for the PPP Model in Public Irrigation Perimeters**

PPP projects in Public Irrigation Perimeters differ from conventional PPP projects because, in the case of irrigation, supply and demand is in the contract from the start. In other words, there is a captive, known demand, which differs from conventional PPP projects where the supply of infrastructure services is offered for bidding in accordance with a non-captive demand estimate that is made in the market. In conventional projects, a demand curve must be estimated, while in irrigation projects, the bidding process for agricultural parcels directly shows the amounts and prices that infrastructure users are willing to demand.

This difference may be an advantage for reducing uncertainty through the prior knowledge of demand. The new PPP version emerges as a promising strategy. Unlike joint-venture companies, it is the public sector that invests in private undertakings. The public counterpayment of a PPP would be justified when private investments themselves only offer fewer services than those considered optimum from a social standpoint.

Experience confirms that public counterpayment in public irrigation projects is crucial in order to guarantee the investment costs (sunk costs). This is also essential for the semi-arid region of Brazil to guarantee that conditions for irrigation will be on the same competitive basis as other richer rainfed areas.

**Final Remarks**

As analyzed, the PPP models in Public Irrigation Perimeters being proposed in Brazil aim not only to incorporate the private sector in investments and construction, but also to attract the dynamism of agribusiness activities that guarantee the desired social development.

The new concept also incorporates small landowners with market orientation in this new productive system in a complementary and integrated manner. This new model, with commercial bases throughout the entire agribusiness chain, aims to provide financial, economic and social sustainability, as well as to favor the minimization of risks and the commitment of the public sector.

PPP projects in Public Irrigation Perimeters offer significant economic and social potential, demanding a careful, specific risk and regulatory analysis to assist in their full realization. The successful implementation of these projects could signify a new era for public irrigation in Brazil that could substantially scale up the already successful social and economic externalities of public irrigation. To be able to bring Brazil’s successful agribusiness into the public irrigation schemes would contribute to promoting regional development in Brazil’s poor semi-arid region.
It is clear that an agenda for Brazil’s future should promote the broad development of irrigated agriculture in the Semi-Arid Region. In this context, Public–Private Partnerships (PPPs) represent a powerful instrument of cooperation between the Public Authority and the private sector with the aim of implementing Public Irrigation Projects (PIPs). PPPs undoubtedly represent a promising and efficient alternative for the development of Public Irrigation Projects.
1. INTRODUCTION

Irrigation in Brazil has unique, specific characteristics compared to other Latin American countries, ranging from institutional, financial, and technological aspects to social and economic objectives. From an institutional perspective, irrigation systems in Brazil are predominantly private (over 90 percent), drawing water directly from rivers, lakes, and dams, without storage in reservoirs, except in transformations/adjustments of surface conveyance systems for on-farm pressurized irrigation systems.

Projects have been developed by private agents since the very beginning (rice in the South, for example, including planning, the construction of hydraulic works and structures, and the operation and maintenance of collective and/or private ownership of this common-use infrastructure - CUI). However, approximately 50 percent of the area of these private systems is fed by electric installations (sub-transmission and distribution) that have been constructed by government rural electrification programs. The financing of irrigation systems and equipment, with subsidies of around 50 percent, was offered to producers throughout the country in the 1970s and 1980s by government programs such as PROVÁRZEA and PROFIR.

Unlike Latin American countries with vast arid regions, such as Mexico, Peru, Chile, and Argentina, which have a century-long tradition of irrigated agriculture, the Brazilian Semi-Arid Region experience with public investments is very recent, based on projects dating back to the early 1970s.

Groundwater supply is limited in the Semi-Arid Region, which is why a large part (approximately 95 percent) of irrigated lands uses surface water. Arable and irrigable lands are usually located in geomorphological conditions and at altitudes that require pumping and conveying water from distant sources. There are few low-lying lands with the capacity to use gravity to divert water. Consequently, water conveyance in Brazilian irrigation projects requires energy (diesel or electric). This in turn makes it necessary to adopt water and energy-saving technologies, thereby affecting primary crop and production models, which must be both efficient and effective, while saving on other inputs and services.

The irrigation methods used in the country may be considered modern, as a natural response to the high energy costs of pumping. With regard to intensive energy use, even rice crops irrigated by flooding in the South use a large set of water-, energy-, and input-saving technologies. Most Brazilian irrigation (52 percent) is pressurized from the point of intake to field application.

Brazilian irrigation is rather diversified from a technological standpoint. An acceptable classification may include: (i) irrigation of rice (by flooding); (ii) complementary irrigation (of other crops); (iii) irrigation of tropical fruits; (iv) irrigation of biomass (sugar cane and pasture/forage); (v) public irrigation in districts (various crops); and (vi) irrigation of vegetables. Gravity irrigation accounts for only 48 percent of the irrigated agricultural area: 42 percent uses flooding (rice) and 6 percent uses furrows or other gravity-based methods. Of the remaining 52 percent, approximately 22 percent uses mobile sprinkler systems, 23 percent uses mechanized sprinkling (central pivot), 1 percent uses perforated or gated tubes, and 6 percent uses localized irrigation, i.e., drip and/or micro-sprinkler systems.¹

The inconsistency of public and budgetary policies contributes to the irregular performance of irrigated agriculture. Table 1 shows the idleness of infrastructure in the country’s PIPs, which supports the government’s decision to seek solutions for these projects through concessions for public services and the use of public lands.

Table 1: Areas with infrastructure (constructed and under construction), in use and in production, in Public Irrigation Perimeters

<table>
<thead>
<tr>
<th></th>
<th>Area (ha)</th>
<th>With Infrastructure</th>
<th>Occupied</th>
<th>Production</th>
<th>GVP (R$ 1,000)</th>
<th>Total outflow (m³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODEVASF</td>
<td>334,239</td>
<td>131,983</td>
<td>113,830</td>
<td>75,848</td>
<td>990,476</td>
<td>353</td>
</tr>
<tr>
<td>DNOCS (1)</td>
<td>127,603</td>
<td>44,325</td>
<td>40,370</td>
<td>17,091</td>
<td>ND</td>
<td>185</td>
</tr>
<tr>
<td>Ministry of Integration</td>
<td>454,369</td>
<td>95,342</td>
<td></td>
<td></td>
<td></td>
<td>682</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>916,211</strong></td>
<td><strong>271,650</strong></td>
<td><strong>154,200</strong></td>
<td><strong>92,939</strong></td>
<td><strong>1,216</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Ministério da Integração Nacional. Avaliação e diagnóstico de PPIs. Brasília, janeiro 2005. (1) Preliminary data; (2) GVP = Gross Value of Production; (3) Flow rate for the total area.

In general terms, the study’s objective is Sustainable Regional Development (SRD) through the implementation of: (i) infrastructure works and equipment for irrigation; (ii) environmental management systems; and (iii) agricultural and nonagricultural businesses in the regions where PIPs are introduced.

The objective of this report is to present and analyze the legal and institutional framework for the implementation of irrigation projects under the PPP modality. It also indicates implementation modality options, in accordance with existing and current legislation; prepares and justifies the choice of procedures; adopts available models and develops new ones for the implementation of partnerships between public and private initiatives and institutions, aimed at the development and improvement of these institutions and the planning and operation of partially implemented public irrigation perimeters, particularly for large and medium-scale projects.

1.1. The Irrigation Subsector: In Brazil and the Semi-Arid Region

The objectives of the first implemented PIPs were highly social, to the exclusive benefit of the region’s traditional small-scale producers. They, however, lacked the necessary managerial, technological, and financial capacity to make adequate use of the full potential of irrigation techniques. The involvement of entrepreneurial producers in projects started in the 1980s led to a new orientation in irrigated agriculture, promoting the establishment of some of the country’s most important agribusiness hubs. The Petrolina-Juazeiro hub, in the São Francisco River Valley, is a good example of this process. Its successful and rapid transformation into a dynamic fruit export center helped change the direction of public irrigation and develop agribusiness, thereby promoting an accelerated expansion of private irrigated agriculture in the Semi-Arid and in the Northeast in general.

The total irrigated area in the Semi-Arid Region is estimated to be 500,000 ha, 140,000 ha of which are located in public perimeters, with about 360,000 ha belonging to the private sector. The different figures shown in Table 1 reflect the fact that the Northeast Region is larger than the Semi-Arid Region, even after including the northern part of the State of Minas Gerais. Some DNOCS and CODEVASF projects are located outside the Semi-Arid Region.

The Brazilian Government has been attempting to replace sector and sub-sector investment concepts with broader definitions that address integrated, compatible development at the regional, river basin, municipal, or local levels. Some international financial agents no longer recommend investing in
economic sectors, but rather in sustainable regional development and thus in the interaction between public and private sectors and subsectors.

1.2. Irrigated Agriculture and Private Investments in the Sector

The Nation-State—the former PIP executor—tends to be the promoter, regulator, and supervisor of these activities, and may also implement them whenever they are considered to be of interest to the Federal Government and to society. This in turn leads to two overall conditions that guide the procedures for political and strategic decision making, structuring actions, and defining productive actions that integrate State and private efforts.

The two situations normally recommended for this type of inter-institutional linkage are as follows: (i) in the case of PIPs featuring works and installations that have not been concluded yet or are under implementation and/or new projects, the recommended modality is that of a Public–Private Partnership (PPP), which is the subject of this study; and (ii) for projects with completed works and installations and with productive processes in operation, the natural course of action is Irrigation Management Transfer (IMT), either by means of a concession of common public service or by delegation.

In either case—PPP or IMT—the agenda proposed for future irrigation and irrigated agricultural techniques takes into consideration the rational, competent use of natural resources, especially water, soil, and genetic resources, and the fully efficient and effective use of technological innovations. It is based on institutions that have been remodeled to address the needs of current and future generations.

In the case of irrigated agriculture, the implementation of concession contracts will play a key role in increasing the supply of food and, to a lesser extent, other essential products. According to projections by the Food and Agriculture Organization (FAO) of the United Nations, the world’s population is growing at a rate of 90 million per year, and 80 percent of the incremental food supply (between 2001 and 2025) will be produced on irrigated lands. The FAO estimates that only 20 percent more water may be available for this additional demand for food, fibers, and biofuels. The difference can only be achieved by more productive and intensive cultivation, and by a more efficient use of water and energy.

1.3. Principal Weaknesses and Needs

PIP weaknesses and needs have specific features in terms of location, purposes, and projects. Projects must therefore be analyzed individually. In general, the analyses made over the past fifteen years, as corroborated by a World Bank-led study, highlight the following challenges:

1. Natural resources with unfavorable conditions, especially due to shortage of rainfall, and ground and surface water; and unsuitable soils;
2. Distance from urban centers, hindering access to essential educational and health services, the provision of supplies and general services, including post-harvest processing;
3. Difficulties in terms of access/transport to shipping ports and marketing;
4. Lack of skilled staff for running multipurpose water supply projects, environmental management, organizing producers and production;
5. Difficulty in ensuring greater private sector involvement and commitment to construction, installations, or productive activities, particularly during early project design and the scheduled implementation period;
6. Lengthy periods of time required to define potential products and production and their respective agribusiness chains;
7. Lack of promotion of crop diversification based on production chains in Agricultural Production Units (APUs), including dryland farming and aquaculture;
8. Lack of organized technological support, which should be provided by research centers and universities;
9. Operational difficulties stemming from inflexible land tenure processes in PIP areas;
10. Gap between the purpose and action of PIPs and local communities, and support and sustainable regional development policies.

1.4. Lessons Learned

The evaluation of irrigation projects in the Semi-Arid Region, which was the subject of the 2004 Report, concluded that there was a very positive evolution in the implementation of irrigated agriculture—both public and private—in the Semi-Arid Region over the past three decades. The focus of public projects evolved from socially based efforts to sustainable entrepreneurial activity, from subsistence farming to agribusiness, from traditional subsistence crops to highly technical fruit cultivation, and from conventional irrigation to modern localized and precision irrigation techniques.

The study showed that the inclusion of entrepreneurial producers in irrigation perimeters, through the successful partnership between public and private sector agents, was the key factor in the positive performance of irrigated agriculture in the region. Other factors that contributed to the projects’ success and converged in an interactive manner in the Petrolina-Juazeiro hub were: (i) suitable scales and rates of implementation; (ii) ongoing political and financial support; (iii) skilled and creative executing agencies; (iv) adequate urban/municipal support; (v) effective technological support; (vi) proximity to markets and ports; (vii) aggressive, efficient marketing; (viii) organization of producers; (ix) organization and standardization of products; and (x) good management of primary production units. Successful projects had high rates of economic return (between 16 and 19 percent), as well as high internal rates of return.

However, although some hubs enjoyed an accelerated rate of development, others, in which some of the aforementioned factors were lacking, showed more modest results, with economic rates of return below 12 percent. The Jaíba Project (MG) is an extreme case of a critical project: its economic rate of return was only 7 percent. Oversized, located in a remote region, far away from markets and large urban centers, with unsatisfactory technical and managerial support, and lacking adequate political support, the Jaíba Project was unable to achieve its goals: 32 years after its inception, only 10 percent of the irrigable area is actually in use. However, it has tremendous potential: by ensuring marginal investments and creating favorable conditions to attract the participation of entrepreneurial producers, project performance could turn around in the medium term.

In general, despite some critical projects, irrigated agriculture effectively contributed to generating employment, increasing regional GDP and per capita income (and consequently reducing poverty in the region), diversifying the economy, improving the quality of life, and retaining potential migrants. The array of public and private projects is estimated to have generated nearly one million direct and indirect jobs. The study concluded that investing in irrigated agriculture is an excellent strategic option for alleviating poverty in Brazil's Semi-Arid Region.

Once the proposed investment in irrigated agriculture is adopted as a strategic option for regional development and poverty reduction in the Semi-Arid Region, the study recommends: (a) prioritizing the conclusion of projects that have already started, and making optimal use of existing infrastructure before initiating new projects; (b) improving the institutional framework, with an emphasis on the relevant legal and regulatory framework; (c) attracting and involving the private sector in implementation, as a means of
making projects more dynamic; and (d) promoting greater commitment to environmental aspects by developing natural resource management mechanisms as a sustainable regional development factor.

2. LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 National Irrigation Policy

Law No 6.662/79 (“Irrigation Act”) governs the National Irrigation Policy. In accordance with its Section 1, the objective of the National Irrigation Policy is “the rational use of water and soil resources for the implementation and development of irrigated agriculture,” in compliance with certain fundamental principles such as the preeminence of the social function and public utility of the use of water and irrigable soils, the promotion of conditions that may provide for greater safety in agricultural activities in light of adverse climatic conditions, and the increase in agricultural production and productivity.

Other fundamental principles that are also mentioned, in accordance with Section 2, are the duties of concessionaires and water users, aimed at promoting the rational use of irrigation systems, in compliance with public and social interests; compliance with rules associated with the prevention of rural endemic diseases and the salinization of soils; and the preservation of the environment and of water quality.

The Irrigation Act also calls for the direct or complementary action of the Public Authority in the stages of drafting, financing, executing, operating, inspecting, and monitoring irrigation projects (Sec. 1, IV).

The aim of Bill No 6,381 (Irrigation Bill), currently being considered by the House of Representatives and already approved by the Federal Senate (PL 229), is to reformulate the National Irrigation Policy, adapting it to present circumstances and revoking Law No. 6.662/79.

In general, the Irrigation Bill, as approved by the Federal Senate and subsequently submitted to the House of Representatives, shares the same objectives and fundamental principles reflected in the Irrigation Act, either adding or emphasizing the following principles, especially the integration of government policies and agencies, as well as the partnership between the Public Authority and the private sector (Sec. 3):

“(a) rational use of soils designated for irrigation [projects], with priority given to their use for the greatest socioeconomic and environmental benefit;
(b) integration with sectoral policies on sanitation, environment, and water resources, aimed at the harmonious use of natural resources;
(c) giving preference to irrigation techniques that consume less water per irrigated area;
(d) integration and linkage between public sector actions in the promotion of irrigated agriculture, at various levels of government;
(e) integration between public and private sector initiatives and actions; and
(f) participatory management of irrigation projects.”

According to the Irrigation Act, irrigation projects may be either public or private (Sec. 8). Public Projects are those whose irrigation infrastructure is designed, implemented, and operated, either directly or indirectly, by the Public Authority (§1). Private Projects are those whose irrigation infrastructure is designed, implemented, and operated by individuals, either with or without public sector incentives (§2). Decree No. 89,496/84, which regulates the Irrigation Act (“Regulating Decree”), defines an irrigation
project as “the set of planning, execution, administration, operation and maintenance activities aimed at the agricultural use of water and soil resources within a certain area” (Sec. 8, §1).

Although this classification makes it possible to easily distinguish between projects that are clearly of a public nature, in which the Public Authority builds and operates the common irrigation infrastructure and settles family farmers, and projects that are entirely of a private nature, carried out with private infrastructure and on private land, the classification of projects with the relevant participation of both the Public Authority and the private sector is not yet clear.

The Irrigation Bill therefore proposes a third category—the Mixed Irrigation Project—defined as a project executed and implemented in accordance with Law No. 11,079/04, which establishes the public–private partnership scheme–PPP (Sec. 12, sole paragraph).

Although the Irrigation Bill has the merit of recognizing, by means of an independent category, the specifics of irrigation projects carried out under the PPP scheme, such projects may also be classified as types of Public Projects, according to the terms of the Irrigation Act, since the implementation and operation of irrigation infrastructure are delivered to the private partner who acts as a concessionaire of a public service, i.e., as the mere executor of the service whose title is held by the Granting Authority.

Therefore, greater attention is given to Public Irrigation Projects, including the Mixed Projects subtype, as described by the Irrigation Bill, since they are directly aimed at social and economic development, which constitutes an important mission of the State.

Legal jurisdiction over PIP projects located in the São Francisco River Basin and, therefore, within the sphere of action of CODEVASF, requires an analysis of the legal and institutional framework at the federal level. Nevertheless, it must be recognized that state and local laws and public entities may be relevant for projects falling within the jurisdiction of the states or municipalities, respectively.

In this regard, the drafting and realization of the National Irrigation Policy is the responsibility of the Ministry of National Integration, the successor of the Ministry of the Interior, according to Law No. 10,683/03, which governs the organization of the Office of the President of the Republic and its Ministries (Sec. 27, XIII, “j”).

Among its other duties, CODEVASF is responsible for the implementation of the National Irrigation Policy, in accordance with the guidelines set by the Ministry of National Integration, to which it is affiliated.

In fact, according to Sec. 4 of Law No. 6,088/74, the specific purpose of CODEVASF is the use of the water and soil resources of the São Francisco Valley for agricultural, livestock, and agro-industrial purposes, either directly or through public and private entities, promoting the integrated development of

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2 See Law No. 6088/74, which provides for the establishment of CODEVASF, and Decree No. 95940/88, which authorizes CODEVASF to implement, manage, and operate public irrigation projects in the Northeast Region.

3 According to Decree 24.643 dated 7-10-1934 (“Water Code”), Sec. 29, public waters for common use, including territorial waters, rivers, lakes, and other bodies of water, belong to the Federal Government, except if those waters are on the boundaries of a single state and do not serve as a boundary with another. According to this hypothesis, these waters will belong to said state, unless they are within the limits of a single municipality and do not serve as a boundary with another, in which case said waters are owned by the respective municipality. This system was accepted by the 1988 Federal Constitution, in accordance with Sec. 20, among others. According to Sec. 62 of the Water Code, “concessions or authorizations for diversions not designated for the production of hydroelectricity shall be granted by the Federal Government, by the States, or by the Municipalities, according to their domain over such waters or according to the public services for which such diversion is designated.” Thus, the Federal Government has the power to authorize or grant the use of water from the São Francisco River for irrigation purposes, and it is naturally empowered to implement public irrigation projects in the São Francisco Valley region.
priority areas and the implementation of agro-industrial and agricultural districts. For this purpose, it may coordinate or execute, either directly or by means of contracting, infrastructure works, especially to impound water for irrigation, for the construction of primary or secondary channels, as well as works for basic sanitation, electrification, and transportation, in accordance with the Master Plan and in coordination with relevant federal agencies.

By delegating to relevant agencies, CODEVASF may also administer and inspect the rational use of water and soil resources (Sec. 4, §2).

The National Water Agency (ANA) is the federal government body in charge of managing and overseeing water resources in Brazil. Created by Law 9984/00, ANA is responsible for the enforcement of the National Water Resources Policy. This is reflected in a number of specific activities it is empowered to perform, such as granting user rights and overseeing the use of water. Despite its rather wide jurisdiction over the regulation of the use of water resources in Brazil, ANA’s current authority with regard to the monitoring of irrigation projects is not clearly defined. Provisional Measure Nº 437/08, which endowed ANA with the authority to oversee and regulate irrigation projects (including the establishment of relevant fees), was revoked by Provisional Measure No. 439/08. The latter piece of legislation was then converted into an ordinary law and does not make any reference to ANA’s jurisdiction over irrigation projects.

2.2 Irrigation in Public Projects

According to the Irrigation Act, Public Irrigation Projects are those whose irrigation infrastructure is designed, implemented, and operated, either directly or indirectly, under the responsibility of the Public Authority (Sec. 8, §1).

A distinction is made between irrigation infrastructure and the land used for irrigated agriculture (which is served by the infrastructure) - the irrigation perimeter, or public irrigation perimeter (PIP).

2.2.1 Irrigation Infrastructure in Public Projects

PIP-related infrastructure includes (i) common-use irrigation infrastructure (off-farm), (ii) on-farm infrastructure; (iii) infrastructure for production support; and (iv) social infrastructure.

According to definitions established by the Irrigation Bill, common-use infrastructure is the set of structures and equipment for water impounding, pipelines, storage, distribution, and drainage; roads and electricity distribution networks located inside the irrigation project; and premises to be used for the irrigation project management.

On-farm infrastructure is the set of improvements and equipment for individual use, implemented on the irrigation project farm lots, whereas infrastructure for production support is the set of improvements and equipment for common use for processing and storing agricultural production, as well as research and extension for irrigated farming.

Social infrastructure is the set of structures and equipment needed to provide health, education, sanitation, electricity, and communication services for the irrigation project.

4 The word “perimeter” is not used in the Irrigation Act or in the Irrigation Bill, but is widely used, even in its Regulating Decree (Sec. 1, §1, d and §2, II; Sec. 4, XIII, a; Sec. 14).
Except for production support infrastructure, all other types are also defined and governed by the Irrigation Act and its Regulatory Decree.5

- **Common-Use Infrastructure**

In the PIPs, the construction, maintenance, and operation of common-use infrastructure are carried out on behalf of a number of irrigation farmers for the sake of public interest or the social purpose of irrigable lands. These irrigation activities or services, according to the definition proposed by the Irrigation Bill,6 perform a true public service, as expressly recognized by Sec. 1, V, of Law No. 9074/95.7

The relevant legislation considers three alternatives for the execution of these irrigation services: (i) first, as services whose responsibility, in accordance with the constitutional requirement, are assigned to the Public Authority (Sec. 175 of the Federal Constitution), they may be performed directly by the Public Administration. This is the alternative that has prevailed for public projects that have been implemented in recent decades, according to a paternalistic model centered around irrigation family farmers. In these public projects, where the construction and implementation of common-use infrastructure are carried out with public budget funds, the infrastructure should be owned by the Federal Government or the public agencies controlled by it; (ii) second, the execution of operation and maintenance services must be delegated to irrigation farmer agencies or associations established for that purpose, in accordance with the emancipation regime, or with the preparatory regimes that precede it: co-management and self-management (Sec. 9 and the paragraphs of the Regulating Decree).8 In theory, emancipation should contemplate the transfer of all financial costs and risks to the service execution agency, in exchange for the water distribution fee that would then be collected from irrigation farmers. Nevertheless, for several reasons, the total transfer of risk according to the emancipation model has rarely been achieved, requiring continued investments and interventions by the Public Authority and creating a dependence that has been difficult to tackle; and (iii) based on the authorization established by Sec. 175 of the Federal Constitution and the provisions of Sec. 1 of Law No. 9074/95 (see also Sec. 20, §1, of the Irrigation Bill), these public services may be granted to private concessionaires, under the common public service concession scheme (Law No. 8987/95) or Public–Private Partnerships, in either the administrative or sponsored concession categories (Law No. 9074/04).

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5 According to Sec. 36 of the Regulatory Decree, common-use irrigation infrastructure refers to all infrastructure “aimed at providing direct support to production, including dams; water pipelines, transportation and distribution structures and equipment; internal roads and transmission lines; the main drainage network; and premises for use by the administration;” internal improvements performed within the lots, in turn, include “deforestation, systemization, parcel channel and drainage systems, housing, and other works for individual use”; and common-use social infrastructure includes “health care and hospital works and equipment, school building and equipment, and urban and sanitation structures and equipment.”

6 Irrigation services: administration, operation, conservation, and maintenance activities for common-use irrigation infrastructure.

7 Operation and maintenance activities for infrastructure aimed at the exclusive service of one or several property owners who have purchased their land outside the scope of a Public Irrigation Project, do not constitute a public service and therefore may be performed under a free enterprise scheme, in compliance with environmental and water-use norms.

8 The constitutionality and legality of this delegation regime, as conceived by the 1984 Regulation Decree, could be questioned in light of Sec. 175 of the Federal Constitution and Sec. 1, V, of Law No. 9074/95. These provisions only allow the concession of public service or, exceptionally, a permit. Nevertheless, this delegation is an existing practice in the Public Administration and therefore cannot be disregarded, although it is subject to legal challenges.
Chart 1. Qualification of public and private services in irrigated farming

<table>
<thead>
<tr>
<th>IRRIGATION SERVICE</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Public Irrigation Service</td>
<td>Service provided on behalf of third party users, according to the Public Law regime (Law No. 9074/95, Sec. 1, V).</td>
</tr>
<tr>
<td>1. Service provided directly by the Public Authority</td>
<td>At federal level, the government itself or the public company it has delegated to (e.g., CODEVASF) provides the services.</td>
</tr>
<tr>
<td>2. Delegated service (emancipation) – IMT Program of the MI</td>
<td>Service delivery is delegated to private entities (e.g., Irrigation Districts) with the objective of emancipating the project and reducing its dependence on the Public Authority (Sec. 9, §2 of Decree No. 89496/84)</td>
</tr>
<tr>
<td>3. Service awarded to a Private Concessionaire</td>
<td>Concession of a common Public Service (Law No. 8987/95) or of a Public–Private Partnership, under either sponsored or administrative concession modalities (Law No. 11079/04). Both cases are based on Sec. 175, F.C.</td>
</tr>
<tr>
<td>II. Irrigation as a Private Economic Activity</td>
<td>Irrigated agricultural activity carried out under a Private Law scheme in the interest of the infrastructure operator, or by private contracting of the owner of the irrigated area.</td>
</tr>
</tbody>
</table>

- Social and Production Support to On-Farm Infrastructure

As a rule, on-farm infrastructure is the responsibility of the farmer, either an individual or a legal entity. Nevertheless, the Irrigation Act authorizes the use of public money for the implementation of on-farm infrastructure on behalf of individual farmers on their respective family lots (Sec. 24).

The Irrigation Bill stipulates the implementation of on-farm infrastructure, for productive and social support purposes, as an obligation of the Public Authority in those Public Projects aimed solely at family irrigation farmers (i.e., Public Projects predominantly geared towards social interests and purposes–Sec. 20, §3).

On the other hand, the Irrigation Act only authorizes the Public Authority to fully or partially implement common-use irrigation infrastructure in support of production—both on-farm and social—in relation to Public Projects based on public utility, i.e., those focused on agribusiness companies acting, as far as possible, under a scheme of integration with family irrigation farmers or small landowners (Sec. 20, §4).

The rationale of the Irrigation Bill appears to have been to provide greater flexibility to the structuring of Public Projects with an entrepreneurial focus, since the present Irrigation Act appears to deny the possibility of allowing the Public Authority to contribute to on-farm infrastructure. Nevertheless, even if the Irrigation Bill is passed and becomes a federal law, the general rule that is expected to prevail in light of public interest states that on-farm and production-supporting infrastructure shall continue to be the responsibility and the primary investment of companies and/or rural producers, even if they have received incentives from the Public Authority. In turn, the Public Authority tends to remain responsible, in general terms, for social infrastructure and for contributing to the implementation of common-use infrastructure, either initially or through public counterpayment under a PPP regime.

2.2.2 The Irrigated Perimeter in Public Irrigation Projects
The implementation of the irrigated perimeter in the PIPs must be carried out first on public land reserved or acquired for this purpose (Sec. 12 of the Irrigation Act and Sec. 20 of the Irrigation Bill). Common irrigation infrastructure must be located within the perimeter itself or on strips of land owned by the Public Authority or its concessionaire, or under an easement instituted on its behalf.\(^9\)

As a rule, no public interest would justify assigning priority to investments by the Public Authority in irrigation infrastructure and its corresponding perimeter on behalf of exclusively private lands and their owners, especially if they are not financially self-sufficient. The Irrigation Act only allows the use of the existing land ownership structure on an exceptional basis, requiring that landowners qualify as “irrigation farmers” (irrigantes) and meet all legal requirements and objectives of the project (Sec. 18).

The Public Authority will acquire land through expropriation, to be initiated by the enactment of an expropriation decree. This expropriation may take place amicably if the property owner agrees with the property value as assessed by either the Public Authority itself, by a contracted third party, or in court, if no prior agreement is reached on the amount of fair compensation for the expropriated area.

According to Sec. 5, XXIV, of the Federal Constitution, the expropriation may be justified as being for public or social purposes. In the context of irrigation, expropriations for social purposes should be used in public projects aimed at settling “irrigation farmer families” on family lots\(^10\) or for small companies, provided they do not occupy an area greater than 20 percent of the irrigated perimeter (Sec. 14 of the Regulating Decree).

In turn, expropriations for public interest are consistent with the Public Irrigation Projects aimed at agribusiness companies. These may include irrigation farmer families or holders of small lots, as explained by Sec. 20 of the Irrigation Bill.

### 2.3. Water Resources Management

Law No. 9433/97 (Water Resources Act) states that the National Water Resources Policy is based upon the following fundamental principles (Sec. 1):

- (a) water is a public domain asset;
- (b) water is a limited natural resource with economic value;
- (c) in situations of scarcity, priority shall be given to human consumption and the watering of animals;\(^11\)
- (d) water resources management must always provide for the multiple use of water;
- (e) the river basin is the territorial unit for implementing the National Water Resources Policy and the actions of the National Water Resources Management System; and
- (f) the management of water resources must be decentralized and include the participation of the Public Authority, users, and communities.

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\(^9\) See Sec. 117 and subsequent articles of the Water Code, Legal Easement of Aqueduct.

\(^10\) According to the Regulatory Decree, a family lot is “a rural estate that is directly and personally used by the farmer and his family, and absorbs all available labor, assuring their subsistence and their social and economic progress, (...) sometimes resorting to the help of third parties” (Sec. 14, §2). And “the family lot, whose size shall correspond to the minimum production area capable of ensuring the economic and social promotion of the irrigation farmer and his family, represents ...indivisible property...” (Sec. 15, caption).

\(^11\) Along similar lines, the Water Code already gave priority to the use of water for the “primary needs in life” (Sec. 71, §3).
The objectives of the National Water Resources Policy are (Sec. 2):

(a) to ensure the availability of water for present and future generations, with appropriate quality standards for its respective uses;

(b) rational and integrated use of water resources, including waterway transportation, aimed at sustainable development; and

(c) prevention of and defense against critical hydrological events of natural origin (droughts, floods, etc.) or those stemming from the inadequate use of water resources.

The Water Resource Plan is noteworthy among the main instruments of the National Water Resources Policy, as are grants and charges for water rights and for the use of water (Sec. 5).

According to Sec. 6 of the Water Resources Act, the Water Resource Plans are master plans that aim to set forth the basis for, and guide the implementation of, the National Water Resources Policy and the management of water resources. According to Sec. 7, these are also long-term plans whose timeframe is compatible with the implementation periods required by their programs and projects.

According to Sec. 11 and subsequent articles from the Water Resources Act, all relevant uses of water are subject to the granting of water use rights, including those for consumption purposes, for use as inputs in productive processes, for the use of its hydroelectric potential or for the discharge of effluents. Exceptions are those diversions, impoundments, discharges, and accumulations deemed to be insignificant, or for their use in meeting the needs of small population centers distributed throughout rural areas. Water use rights are granted by means of an authorization to be issued by the National Water Agency (ANA), instituted by Law No. 9984/00.

Therefore, the use of water for irrigated farming also requires the granting of water use rights. According to the fundamental principles and to Sec. 15 of the Water Resources Act, this use may be interrupted if necessary for uses of greater priority, including disaster situations such as severe drought.12

The granting of water use rights is limited to a 35-year term, which may be renewed. In accordance with Law No. 9984/00, such a grant is also subject to a two-year deadline for starting the enterprise for which such a grant was requested and six years to conclude it. These terms may be extended whenever justified by the size and social and economic importance of the undertaking, upon recommendation by the National Water Resources Council.

Nevertheless, according to Sec. 5, §4, of Law No. 9984/00, the granting of water use rights for concessionaires and agencies authorized to carry out public services and electricity generation shall be in force for terms coinciding with those of the corresponding concession contracts or administrative authorization acts. Thus, it may be concluded that grants for Public Irrigation Projects can provide for start-up and completion periods, as well as the duration of the grants, coinciding with those that are the subject of the concession for irrigation services.

The Water Resources Act also calls for the collection of fees for water use rights so that water may be recognized as an economic asset and users may have an indication of its real value. This encourages the rational use of water, and financial resources may be obtained to finance the programs and interventions contemplated by the water resource plans (Sec. 19). The Act also established the National Water Resources Management System, whose objectives are to: coordinate the integrated management of water; administratively arbitrate conflicts related to water resources; implement the National Water Resources

12 See also Sec. 4, §7, of Law No. 9984/00.
Policy; plan, regulate and control the use, preservation, and recovery of water resources; and promote the collection of fees for water use rights (Sec. 32).

According to Sec. 33 of the Water Resources Act, the National Water Resources Management System is composed of the National Water Resources Council, ANA, the Water Resources Councils of the states and of the Federal District, the River Basin Committees, the federal, state, and municipal public agencies whose responsibility is to manage water resources, and the Water Agencies.

Among the various duties assigned to it by Sec. 35 of the Water Resources Act, the National Water Resources Council is responsible for promoting the coordination of national, regional, and state plans and those of the user sectors prepared by the entities that make up the National Water Resources Management System. It is also responsible for formulating the National Water Resources Policy, in accordance with the Water Resources Act.

ANA is a government agency that is affiliated with the Ministry of Environment but under a special regime with administrative and financial autonomy. Its purpose, as previously mentioned, is to implement the National Water Resources Policy within the scope of its responsibilities, in a manner that integrates the National Water Resources Management System (Sec. 3).

The actions of each River Basin Committee are aimed at a particular river basin. Each committee is responsible for approving the Water Resources Plan for its respective basin, monitoring its execution and recommending actions so that its goals can be achieved, establishing mechanisms to collect fees and proposing amounts to be collected from water use right grants (Sec. 38 of the Water Resources Act). The Water Agencies will act as executive secretariats for the corresponding River Basin Committees (Sec. 41).

**2.4. Environmental Management**

Sec. 225 of the Brazilian Federal Constitution classifies the environment as a common-use asset that is essential for a healthy quality of life, making the Public Authority and the community responsible for protecting and preserving it for present and future generations. The National Environment Policy, outlined by Law No. 6938/81, regulates the civil liabilities for damage caused to the environment.

The aforementioned legal liability shall be objective, i.e., irrespective of guilt. Evidence must be presented of the causal relationship between the damage done and the action or omission committed in order for the polluter to be held liable for repairing the environmental damage. There is no need to demonstrate any intention to cause the damage or any particular negligence. Circumstances pertaining to the fact that the polluter has the required environmental licenses for operating do not exempt him or her from responsibility.

The National Environment Policy has expanded the list of natural or legal entities subject to environmental liability, providing for joint liability among polluters. The victim of environmental damage, or whoever is authorized by law to act as such, is not obliged to sue all polluters through a single legal action. Since there is collective liability, the plaintiff may choose one of the polluting companies (either the one that meets all requirements for acting as defendant in a legal action, or simply the one with the best financial status) to effectively repair the damage. The company that has been sued may exercise its right to claim proportional compensation from other polluters by means of a separate procedure. Although the law makes no express reference, according to the scholar’s understanding, the redress of environmental damage is not subject to the statute of limitation.
At the criminal level, the Environmental Crimes Act (Law No. 9605/98) states that any individual or corporation that contributes to the practice of certain acts deemed harmful to the environment under criminal law can be held accountable. The law ascribes criminal liability to legal entities. Therefore, once an environmental offense occurs, the director, officer, auditor, manager, employee, or agent of a legal entity may also be subject to punitive sanctions, depending on the case.

Law No 9605/98 was regulated by Decree No. 3179/99 regarding administrative penalties. Any action or omission that violates the rule of law regarding the use, enjoyment, promotion, protection, and recovery of the environment is considered an environmental administrative infraction that may be subject to a one-time or daily fine, an embargo of work or activity, a partial or total suspension of activities, a restrictive penalty, and/or an obligation to repair the damage caused.

The National Environment Act foresees environmental licensing as one of its instruments. According to this law, the construction, installation, expansion, and running of establishments and activities deemed to be effective or potential polluters, as well as those capable of causing any type of environmental degradation, shall be subject to prior licensing by the relevant environmental agency (regardless of other legally required licenses). This agency shall establish the conditions, restrictions, and measures necessary to inspect the undertaking.

Irrigation enterprises may cause environmental modifications and are therefore subject to environmental licensing. The environmental licensing process, governed by CONAMA Resolution 237/97, consists of a three-stage system in which each license is contingent upon the issuance of the prior license, in the following sequence: Prior License (PL), Installation License (IL), and Operational License (OL).

The relevant environmental authorities may suspend or cancel a license based on a well-informed decision in the following cases: (i) violation of or non-compliance with any legal condition or norm; (ii) omission or false description of relevant data that has served as background information for the issuance of the license; and (iii) exposure to severe environmental or health risks.

The absence of licenses or authorizations by the relevant environment agencies subjects the offender to civil sanctions and especially to administrative actions that may culminate in the fines envisaged under the legislation, ranging from R$500.00 (five hundred reais) to R$10,000,000.00 (ten million reais). Regardless of any fines, penalties such as embargo, deactivation, and demolition, among others, will be considered as well.\(^\text{13}\)

According to CONAMA Resolution 01/86, the licensing of certain activities that modify the environment, listed therein, shall depend on the preparation of an Environmental Impact Statement (EIS) and its corresponding Environmental Impact Report (EIR), to be submitted to the relevant agency for approval. According to Sec. 2, VII, of the said Resolution, the licensing of waterworks for the development of water resources, such as dams and the opening of irrigation channels, shall be the subject of an EIS/EIR.

In addition to meeting legislation requirements, the EIS must also comply with certain general guidelines: (i) take into consideration all technological and project location alternatives and compare them to the hypothetical non-execution of the project; (ii) systematically identify and secure the environmental impacts generated during the activity’s implementation and operational stages; (iii) define the boundaries of the geographical area to be directly or indirectly affected by the impacts, i.e., the project’s area of influence; and (iv) consider government plans and programs, both proposed and under implementation, within the project’s area of influence, and their compatibility.

\(^{13}\) Federal Decree 3.179/99, which establishes administrative sanctions for environmental infractions.
CONAMA Resolution 284/01, in turn, created specific rules regarding the licensing of irrigation enterprises, which are classified according to the actual size of the irrigated area per individual property, and the irrigation method used.

According to Sec. 2 of the said Resolution, an irrigation enterprise is the set of works and activities that compose it, such as: reservoir and impoundment, pipeline and water distribution, drainage, internal roads, and the plantation itself, as well as any other action essential for obtaining the final product of the irrigation system.

The Resolution also stipulates that environmental licensing agencies may define differentiated criteria of eligibility and alternative procedures for licensing, taking into account—in addition to size—the enterprise’s technical characteristics, location, water consumption, and regional specifics, as well as the compatibility of the licensing process with the planning, implementation, and operational stages (Sec. 5). Furthermore, those projects that incorporate more efficient irrigation equipment and methods with regard to lower water and energy consumption will always be given priority (sole paragraph).

Considering that pollution control is directly associated with health protection, the assurance of an ecologically balanced environment and an improvement in the quality of life, taking into account the priority uses and classes of environmental quality that are required for a certain body of water, CONAMA Resolution 357/05 classified all bodies of water and established environmental guidelines for their classification and the conditions and standards for effluent discharge.

In addition to environmental licensing, the irrigation enterprise must respect the administrative restrictions on the use of a rural property, as imposed by the Brazilian Forest Code (Federal Law 4771/65). One such restriction is the obligation to earmark a part of the property for environmental conservation purposes, i.e., as a legal reserve (LR).

In most of the country, legal reserves must correspond to 20 percent of the rural property. In the Legal Amazon, the percentage is 80 percent in forest areas and 35 percent in savanna areas. The location of the reserve must be submitted to approval by the relevant state environment agency. Furthermore, it is mandatory to register the LR in the real estate registration system.

Sec. 44 and subsequent articles of the Forest Code establish four means of clearing a legal reserve that has not yet been created or that has been degraded:

1. Recomposition by planting trees every three years, covering at least one tenth of the total area required for complementing the reserve;

2. Natural regeneration;

3. Compensation by means of the creation of a legal reserve in another area that is equivalent to the original one in terms of its ecological importance and size, provided that (a) it belongs to the same ecosystem and is located within the same microcatchment, and (b) any suppression of vegetation carried out after December 14, 1998 has been duly authorized by the relevant environment agency; or

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14 For reserve purposes, the Legal Amazon includes the States of Acre, Pará, Amazonas, Roraima, Rondônia, Amapá, and Mato Grosso, and the regions located to the north of parallel 13º S in the States of Tocantins and Goiás, and to the west of the 44º W meridian in the State of Maranhão.
4. Donation of an equivalent area within an integrated conservation protection unit (parks, ecological reserves, etc.).

The aforementioned clearance process shall be completed within a 30-year period.

The Forest Code defines some areas as being earmarked for preservation or permanent reserve (PR) purposes, regardless of whether they are rural or urban properties. Some examples of PRs are river banks, hilltops, and areas surrounding dams. There are no legal requirements for the compensation of degraded PRs, as in the case of legal reserves. This means that their recovery must be carried out in the locations established by law as Permanent Preservation Areas (PPAs). Furthermore, there is no need to register these protection strips.

In cases of public or social interest, in the absence of a technical and location alternative to the enterprise being proposed, the suppression of vegetation on a PR may be authorized. The environment agency may authorize such suppression if it is temporary and low impact, as defined in the by-laws. The concepts of “public interest,” “social interest,” and “low impact” were regulated by CONAMA Resolution 369 of March 28, 2006. The approved text defines public interest as, among other things:

1. Public works for the implementation of installations required for the collection and conveyance of water and treated effluents; and
2. Implementation of installations necessary for the collection and conveyance of water and treated effluents to private aquiculture projects.

2.5. Occupation of the Irrigated Perimeter

Depending on the Public Irrigation Project model, the occupation of the irrigated perimeters, after their due expropriation, may take place by means of: (i) the assignment of land ownership for an established period of time and linked to its use; (ii) land lease; (iii) assignment of use; (iv) concession of use; (v) concession of the right in rem to use; or (vi) use as equity contributions to companies whose purpose is irrigated agriculture. The alienation, lease, assignment, or concession may take place on behalf of a family irrigation farmer or company.

Property assignment is an alternative that is more in line with public projects based on social interest, through which land is to be given to family farmers so that they can earn their living from it. As expressed by law (Sec. 26, §§1, 2, and 4 of the Irrigation Act), deviations from the designated purpose, the non-use of land for irrigated farming purposes, or noncompliance with any other legal norm or by-laws shall render the rural producer subject to the immediate termination of relevant contracts regulating his title to the land. If the farmer is the owner of the irrigable lot, deviation from the designated purpose or noncompliance with rules and by-laws will authorize expropriation based on the social interest of his property.

A land lease is an alternative associated with Private Irrigation Projects, by which the Public Authority, whenever it is acting as the landowner, may lease the land under similar conditions to those offered by the market. Land leasing may also be used for Public Irrigation Projects, especially for purposes of public interest, when companies are in an economic position to take over the corresponding rent.

Assignment of use, concession of use, and concession of right in rem to use are similar concepts, all of which offer the advantage of allowing for the return of the assigned or granted asset to the Public Authority at the end of the contract period. They are the most appropriate concepts for Public Irrigation Projects, since as a rule they assume respect for a certain burden or purpose that falls upon the assigned or granted property, thus hampering the unauthorized alienation of the asset by the assignee or grantee. The
return at the end of the contract also allows the Public Authority to take property over the value of the properties that make up the perimeter. It may again offer them for bidding, especially in Public Irrigation Projects of public interest in those perimeters that are predominantly utilized by companies.

Assignment of use is governed by Section 18 and subsequent articles of Law No. 9636/98, and by Decree-Law No. 9760/46. The concession of use of a public asset is generally regulated by Law No. 8666/93 and has often been used for granting rights over the use of federal assets by private entities, as in the case of hydroelectric potential.

The concession of the right of use is governed by Sec. 7 of Decree-Law No. 267/67, and has the advantage of providing not only for an obligation right on behalf of the grantee, but a right in rem, subject to its being offered as collateral (e.g. mortgage) to financial agents. Although the concession of the right of use has not been employed within the framework of irrigation projects, the concept is quite appropriate for such a purpose. In addition to the possibility of offering this right as collateral, the concession of the right of use would allow for its subconcession as a means of providing for the inclusion of family farmers or small-scale landowners in the flagship companies appointed as grantees.

The incorporation of irrigable areas in the capital of the company dealing with irrigated agriculture assumes the participation of the Public Authority in the capital of this company, either directly or through public enterprises such as CODEVASF, which is already legally authorized by Sec. 9, I of Law No. 6088/74.

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15 “Sec. 18. At the discretion of the Executive Authority, federal real estate may be assigned, either free of charge or under special conditions, under any regime foreseen by Decree-Law No. 9,760/46, to: I) States, Municipalities and (...); II) individuals or legal entities, in case of public or social interest or economic use of national interest that merits such favor.”

16 Cf. Hely Lopes Meirelles. Licitação e Contrato Administrativo. 14ª Ed. São Paulo: Malheiros, 2006. “The concession of use, as a right, adheres to the asset and accompanies it throughout all its mutations, being alienable through an inter vivos act and transferable by legitimate or testamentary succession. Allows mortgage and any other encumbrance, as any other right, with the only difference being that the real estate shall revert without burden to the granting administration if the grantee, his buyers or successors do not comply with the promised use or deviate from its contractual purpose.” (p. 353)
Chart 2. Land Grants—Regime, legal basis, and characteristics

<table>
<thead>
<tr>
<th>Scheme for Granting Lots that comprise the Irrigated Perimeter</th>
<th>Legal Basis</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment of land</td>
<td>Law No. 8666/93; Purchase/Sale (Civil Code, Sec. 481 and subsequent articles and Sec. 538 and subsequent articles)</td>
<td>More consistent with projects based on land distribution or social interest, targets small-scale farmers. Nevertheless, assignment makes it difficult to take back the property in case of improper use or deviation from the intended purpose (e.g., speculation or resale). Not recommended for projects targeting agribusinesses. There is no return of the asset to the Public Authority.</td>
</tr>
<tr>
<td>2. Lease</td>
<td>Law No. 8666/93; Sec. 95 and subsequent articles of Decree-Law No. 9760, of 1946; Lease (Civil Code, Sec. 565 and subsequent articles); and Sec. 95 of the Land Statute (Law No. 4504/64)</td>
<td>May be used in projects aimed at agribusiness companies (public interest), but faces restrictions under the Law No. 4504/64 (“Land Statute”) (Sec. 94). Assignment and concession of use are concepts that are more appropriate for the purpose of granting temporary ownership of land to a private entity.</td>
</tr>
<tr>
<td>3. Assignment of Use</td>
<td>Law 9,636/98, Sec. 18 and subsequent articles, and Decree-Law No. 9760/46.</td>
<td>Scheme appropriate for granting a stable use of land for a determined period of time to a private entity, either with an encumbrance or free of charge. The term of the assignment is subject to its use in a manner that serves public or social interest and is in accordance with a previously established purpose. It does not establish a right and in that sense is less attractive to financial agents.</td>
</tr>
<tr>
<td>4. Concession of Use of Public Asset</td>
<td>Generically governed by Law No. 8666/93</td>
<td>Same as above.</td>
</tr>
<tr>
<td>5. Concession of Right in Rem to Use</td>
<td>Decree-Law No. 267 of 2-28-67, Sec. 7</td>
<td>Same as above, with the advantage of granting a right in rem—and therefore, being more stable—to the grantee, allowing the creation of a mortgage or other encumbrance to the benefit of financial agents.</td>
</tr>
</tbody>
</table>

2.6. Agriculture

The main federal government agencies dealing with the agricultural sector in Brazil are the following:

a) The Ministry of Agriculture, which deals with policies and programs for commercial agriculture for both export and domestic markets, including soybeans, coffee, poultry, livestock, rice, and dairy products. The Ministry of Agriculture includes the National Agricultural Policy Council and the Secretariat of Agricultural Policies, among others. In addition, other important agencies are related to the Ministry of Agriculture, including the Brazilian Agricultural Research Company (EMBRAPA) and the National Supply Company (CONAB).

b) The Ministry of Agrarian Development, which focuses on family farming and land reform. It includes the National Institute of Colonization and Agrarian Reform (INCRA), which focuses on expropriating unproductive land and creating settlements for landless farmers. It also includes the National Program for the Strengthening of Family Farming (PRONAF), a subsidized credit program targeting rural families in areas lying within and outside of settlements.

17 The Ministry of Agriculture also deals with fisheries policies.
c) The Ministry of National Integration, which deals mainly with irrigation and programs to promote the development of the country’s neediest regions. The main executing agencies of the Ministry of National Integration are: CODEVASF, which implements irrigation projects in the São Francisco River Basin; the Northeast Development Agency (SUDENE), which implements programs that target the Northeast; and the Office of the Superintendent for the Development of the Amazon Region (SUDAM), which implements programs that are geared towards the Northern Region. In addition, the Ministry of National Integration implements, among other programs, the National Employment and Income Program (PRONAGER), a national program focused on training and in charge of three funds to promote the development of the Amazon (FINAM), the Northeast (FINOR), and the Center-West (FCO).

d) The Ministry of Environment, which implements policies and programs for the conservation and sustainable use of natural resources, as well as measures to control pollution. This Ministry is also in charge of water policies, with the exception of irrigation. The Brazilian Institute of Environment (IBAMA) is its main executing branch.

e) ANA, which is in charge of implementing the National Water Resources Policy and has legal jurisdiction for overseeing the use of water resources in Brazil. ANA is also a branch of the Ministry of Environment, but is financially and politically independent.

This institutional system is the result of significant policy and institutional reforms in the agricultural sector that have been implemented since the early 1990s. Until that time, the Ministry of Agriculture was the main federal government agency dealing with agricultural policies. Pressures from social movements—especially in the form of land invasions in the countryside—placed land distribution policies at the center of the political agenda. As a result, land reform issues were transferred to the Office of the President in 1995, and the Ministry of Agrarian Reform was specifically created to deal with them.

The Federal Government accelerated the creation of new settlements and began to implement a new program that provided long-term credit to landless farmers and helped them purchase land. In 1999, a Ministry of Land Policy and Rural Development (later renamed the Ministry of Agrarian Development, MDA) was created to deal not only with land policies but also with family farming in general. The Ministry of Agrarian Development includes the National Institute for Rural Settlement and Land Reform (INCRA) as the executing agency of the land reform, and the National Family Farming Program (PRONAF), a credit program for family farmers that is made available nationwide through Banco do Brasil and Banco do Nordeste.

While the Ministry of Agrarian Development dealt with family farming, the Ministry of Agriculture concentrated on commercial agriculture, focusing on programs to promote products for both export and domestic markets (mainly coffee, soybeans, sugar cane, fruit, rice, livestock, and dairy products), and on international agricultural negotiations. In addition, since 1999, the Ministry of Agriculture has been dealing with fishery policies, which were formerly the responsibility of the Ministry of Environment, Water Resources and the Legal Amazon.

Despite the relevance of these ministries, policy making in Brazil is characterized by the great importance bestowed upon Congress, civil society organizations, and research institutions. State governments have a strong influence on both chambers of Congress. Congressmen tend to be more loyal to the interests of groups than to parties or policies, and individual politicians, especially state governors and mayors, exert great influence. Given the strong federative nature of the Brazilian Constitution and the high degree of state autonomy, most legislative issues are viewed in terms of their regional impact, so the most powerful political forces in Congress are regional lobbies that transcend party boundaries.
Furthermore, Brazil underwent an important process of decentralization during the 1990s, allowing local governments to exert a strong influence on policy making. A new constitution approved in 1988 transferred various functions to state and municipal governments (such as public extension services) and gave them the capacity to collect several important taxes. Most state governments have their own Secretariats of Agriculture and carry out a wide range of tasks related to the agricultural sector, such as agricultural extension and research, irrigation investments, and poverty alleviation projects, especially in the Northeast.

Outside the government, civil society organizations, universities, and other research institutions play a very influential role in policy making. The Landless Movement (Movimento dos Sem Terra, MST) emerged as a new political force in the 1990s, heading land invasions throughout the country and thus having a strong influence on government decisions concerning land policies. The National Confederation of Agriculture Workers (Confederação Nacional dos Trabalhadores da Agricultura, CONTAG), which represents rural workers and family farmers, has also been influential in convincing the Federal Government to include family farming in the policy agenda. Businessmen have been a relatively influential force in policy making as well, especially through state-level industry federations and regional associations of exporters, such as the São Francisco Valley Association of Producers and Exporters (Associação dos Produtores e Exportadores do Vale do Rio São Francisco – VALEXPORT), which is quite influential in international trade negotiations and agricultural research conducted by government research agencies (EMBRAPA).

Research institutions have traditionally played an influential role in policy making. Several Brazilian universities carry out extensive agricultural policy research, especially the Federal University of Rio de Janeiro and the Universities of Campinas and São Paulo. The Federal Government also has a well-known research agency that specializes in policy research, the Institute for Applied Economic Research (Instituto de Pesquisa Econômica Aplicada, IPEA) which is part of the Ministry of Planning and Budget. In addition, the Ministry of Agrarian Development created as a part of its structure a Center for Agrarian Studies and Rural Development (Núcleo de Estudos Agrários e Desenvolvimento Rural, NEAD), which has a small permanent team of researchers and commissions studies from Brazilian universities.

3. PUBLIC-PRIVATE PARTNERSHIP LEGAL AND REGULATORY FRAMEWORK

3.1. Public–Private Partnerships: Concept and Understanding

Partnerships between the public and private sectors are not a novelty in Brazil, since they have, in one way or another, been practiced in the country ever since its discovery. A distinction should thus be made between Public–Private Partnerships in a broad sense, and the new type introduced by Federal Law No. 11079/04 (PPP Act), i.e., the Public–Private Partnership in a strict sense.

In a broad sense, Public–Private Partnerships—understood as any cooperation between the public and the private sectors for the purpose of executing certain undertakings—may involve various tools, such as bidding for public works, common concession of public services, concession of use of a public asset, concession of user rights, permits, authorization for carrying out regulated activities, agreements, administrative contracts in general, consortiums involving public administration and private entities, public and private joint ventures, outsourcing, and franchising. Public–Private Partnerships (PPPs), strictly speaking, are an alternate means of cooperation between the public and private sectors, specifically based on Federal Law No. 11079/04 (PPP Act) and the related legislation.
Hence, a Public–Private Partnership *per se* may be defined as a new type of collaboration between the public and private sectors, introduced and governed by Federal Law No. 11079/2004, and based on a long-term concession contract. Its objective is to provide a service or utility that may be enjoyed by the community or Public Administration. The Public Authority is responsible for the payment or guarantee of part (sponsored PPP) or all (administrative PPP) of the concessionaire’s revenue.

### Chart 3. Alternatives for the contracting of the private sector by the public sector

<table>
<thead>
<tr>
<th>Schemes for the contracting of the private sector by the public sector or for public–private investments</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bidding for Public Works</td>
<td>Public Authority is responsible for specifying the work and for its operation and maintenance, delegating to the private entity only the execution of the work (Law No. 8666/93).</td>
</tr>
<tr>
<td>2. PPP: Administrative Concession</td>
<td>Private Partner is responsible for the project, for the execution and financing of the work, and for its operation and maintenance during the contract term, in order to provide a utility or render a service that may be used by the Public Administration or the community in general. Public Authority pays all revenue of the private entity. For example: prisons (Law No. 11079/04, Sec. 2, §2).</td>
</tr>
<tr>
<td>3. PPP: Sponsored Concession</td>
<td>Private Partner is responsible for the project, for the execution and financing of the work and for its operation and maintenance during the contract period, in order to provide a utility or render a service that may be used by users from the community in general. Public Authority is responsible for the payment or guarantee of a part of the private partner’s revenues. For example: toll roads (Law No. 11079/04, Sec. 2, §1).</td>
</tr>
<tr>
<td>4. Common Concession of Public Service</td>
<td>Private concessionaire is responsible for the execution and financing of the work and for its operation and maintenance during the contract period, in order to provide a public service to users, and is fully reimbursed by the corresponding tariff. For example: electricity transmission (Law No. 8987/95).</td>
</tr>
<tr>
<td>5. Concession of Use of Public Asset</td>
<td>Private concessionaire is authorized, by means of an administrative contract (concession), to use and develop a public asset, at its own expense and risk, but is subject to public regulation. For example: generation of hydroelectricity under an independent production scheme; oil exploration (Law No. 8666/93 combined with sectoral laws).</td>
</tr>
<tr>
<td>6. Permit</td>
<td>Private entity is in charge of executing the public service through a unilateral act by the Public Authority, and must provide the service at its own expense and risk and through the fee paid by users.</td>
</tr>
<tr>
<td>7. Authorization</td>
<td>Private entity is authorized, through a unilateral act by the Public Administration, to carry out an economic activity, subject to regulation due to public interest. For example, marketing of electricity, cellular telephone service, etc. (sectoral laws).</td>
</tr>
<tr>
<td>8. Joint Venture</td>
<td>Venture controlled by the State but receiving private capital, operating in strategic economic sectors. For example, Petrobrás, IRB, Banco do Brasil (Decree-Law No. 200/67).</td>
</tr>
<tr>
<td>9. Consortium between Public and Private Agencies</td>
<td>Consortiums involving public and private entities for a defined undertaking [Secs. 278 and 279 of the Brazilian Corporation Act (Law No. 6404/76)], with relevant authorizing laws such as Secs. 63 and 64 of Law No. 9478 and Sec. 22 of Law No. 10438).</td>
</tr>
<tr>
<td>10. Franchise</td>
<td>For example, postal and telegraph services</td>
</tr>
</tbody>
</table>
As shown in the foregoing chart, the Public–Private Partnership is a new alternative for the contracting of the private sector by the public sector, and is a sort of intermediate process between the bidding for public works and the concession of a common public service.

3.2. Context of the Public–Private Partnership and the PPP Act

With the decreased volume of investments due to privatization and common concessions, the PPPs came about as a means of attracting a new wave of private investments in projects with a strong social interest, especially in the infrastructure sector. Such projects would otherwise not be economically feasible or would be relegated to action by the State, depending on the availability of rather scarce budget allocations.

Thus, PPPs are a response to the limitations noted in traditional investment schemes through collaboration between the State and the private sector (concessions, permits, authorizations, and bidding for public works). Studies have been carried out, culminating in the submission to the House of Representatives, on November 19, 2003, of a bill proposed by the Executive Branch and championed by the Ministry of Planning. This bill finally became Federal Law No. 11079/04.

Parallel to this, several states and municipalities have already approved laws creating and regulating state or municipal public–private partnership programs. These laws must comply with the general rules established by Federal Law No. 11079/04, but may govern the special features of the local partnership program, serving as a guarantee for the local management agency.

3.3. General Considerations on Public–Private Partnerships

PPPs differ from traditional state–private sector investment and cooperation schemes in three key ways: (i) private sector remuneration assumed or guaranteed by the State; (ii) long-term nature; and (iii) linkage between remuneration and performance.

- Payment Commitment by the State

Unlike the concession for public service or use of a traditional public asset, in the PPP contract, the State assumes the commitment to fully or partially remunerate the private partner, or at least guarantee a minimum amount of remuneration if other sources of remuneration prove to be insufficient. The difference is substantial. In the common public service concession, the concessionaire must obtain all of its remuneration through fees collected directly from users. The original version of the bill that culminated in the approval of Law No. 8987/95 (Public Service Act) contained express provisions that authorized the State to provide, subsidize, guarantee, or complement the tariff charged (Sec. 24). However, these provisions were purposely vetoed, since at that time—and correctly to a certain extent—priority was intended to be given to private sector participation in projects that were entirely self-sustainable, regardless of any state subsidy.

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18 The original text stated: “Sec. 24. The Granting Authority may guarantee, under the concession contract, a minimum gross revenue or, in the case of highway works, that corresponding to minimum traffic, during the first third of the concession term.”

19 In the State of São Paulo, for example, this concern was so great that Section 119, sole paragraph, of the State Constitution established that public services will not “receive subsidies from the Public Authority, in any measure, when provided by private entities.”
Thanks to this feature of the PPPs, all or part of the tariff, demand, and market risks are removed. That is sometimes crucial in making a project economically feasible in the eyes of the private sector, especially under a project financing scheme. Due to this configuration, other risks may also be added (government credit risk, political risk, etc.). Otherwise, if the project is shown to be economically viable, regardless of the assumption of payment commitments by the State, it will not be necessary to consider them in the application of PPPs. Preference is instead given to traditional concessions, unless there is another prevailing public interest that would recommend the contrary.20

**Long Term**

However, public counterpart funds are not enough to differentiate a PPP from traditional bidding for public works, in which the State assumes the responsibility for remunerating the successful bidder.

This differentiation stems from the second feature, i.e., the long term which, according to the PPP Act, should range from a minimum of 5 to a maximum of 35 years. Unlike bidding for public works, in which the State is obliged to issue payment for the work practically on demand (throughout measurement, but within a period of no more than 30 days after the work’s completion), in PPPs the State makes payments to remunerate the private partner throughout the contract period, as the contracted services (e.g., operation of the work and making the work and its utilities available for the public’s use) are provided.21

The long term is therefore the basic premise of the PPP contract which, in accordance with the PPP law, takes the form of a sponsored or administrative concession, depending on whether the services are aimed at a defined user, the community in general, or the Public Authority, contrary to the common concession of public services, as originally addressed by the Concession Act (Law No. 8987/95).

**Linking Remuneration with Performance: Debt versus Current Expenses**

However, if this long term meant a mere extension or fractioning of payments for the work, it would serve only for the bidder/builder to grant credit, thus generating an indebtedness not much different from any other and therefore subject to the limitations in Sections 30 to 40 of the Fiscal Responsibility Act.

The third feature of the PPPs eliminates this interpretation. Through a PPP, the State does not contract the construction of a work on a credit basis, but rather the provision of a service over the long term, to be paid as it is delivered. If this service requires the construction of a public work, this will be concluded through the private partner’s financing, at its own expense and risk, as an activity that is merely incidental to the services contracted. However, the actual objective of the PPP contract will continue to be the provision of a service, i.e., properly maintaining and operating the work and making it or its utilities available for the State or community to enjoy.

This is why remuneration linked with performance is mentioned. The private partner will only be entitled to payment if, during each reporting period (monthly, quarterly, or another frequency), the service is delivered in a timely and adequate manner, i.e., if the public infrastructure constructed to provide the

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20 Public interest may eventually advocate the use of a PPP arrangement, even if it appears to be self-sustainable at the beginning. The Public Authority may believe, for example, that the tariff must be maintained at a level below the one that would make it profitable, aiming at making it more accessible to the community. Or the Public Authority may not consider it appropriate to previously define a policy for tariff readjustments to be applied during the full duration of the concession, understanding that public interest may advise a readjustment lower than the evolution of sectoral or inflation rates. This is the case, for example, for the subway service, whose tariff, through a political decision, can be maintained at a subsidized level that is insufficient for meeting needs for new investments.

21 “Law No. 11,079/04, Sec. 7. Any counter-payment by the public administration shall necessarily be preceded by the availability of the service that is the objective of the public–private partnership contract.”
services is properly operated and maintained and made available to the State or community to enjoy, as the case may be.

Under these conditions, as a rule the PPP will not impose debt on the State because in both legal and accounting terms, these future commitments, which are subject to the performance and delivery not yet accomplished by the private partner, cannot be qualified as debts. There are, in fact, future commitments that could indeed burden the state apparatus, but only when (and to the extent) the service is delivered in accordance with contractual requirements.

These commitments are defined by the Fiscal Responsibility Act as current expenses of an ongoing nature, and their assumption, in accordance with Sections 16 and 17 of said law, is subject to maintaining the long-term budget balance of said State entity through the ongoing increase in revenue or the ongoing reduction of expenses that can counterbalance them.

In PPPs, remuneration linked to performance may be—and it is recommended that it should be—raised to an even higher level, so that the remuneration payable to the private partner is at least partially variable, according to the rating achieved by the private partner in terms of the various quality and performance requirements stated objectively in the PPP contract.\textsuperscript{22}

To some extent, this variable revenue model has already been adopted with good results in traditional public service concessions, such as in the transmission of electricity, in which 12.5 percent of the concessionaire’s revenue is directly linked to the availability of the transmission lines it operates.

On the one hand, the objective statement of these quality requirements and rating criteria tends to promote good performance much more than the fear of being fined, as envisaged in the traditional concession scheme. This is because objective, clear criteria remove the risk of impunity, while the determination of variable revenue may be applied immediately, unlike fines which require an administrative process that is naturally lengthy because it is subject to broad defense and contesting, as well as the greater degree of subjectivity that is usually present.

On the other hand, the objectivity and clarity of criteria translate into greater security and reliability for the private partner when it has clear, prior knowledge of those factors—within its sphere of control—that may reduce its periodic remuneration. This security and reliability may be strengthened, as in international experiences, if the verification of compliance with quality and performance requirements is attributed to an independent, impartial verifier, free of pressure from public and private partners.

\textbf{3.4. Scope of the PPP Act in the Public Sector}

According to Sec. 22, XXVII of the Federal Constitution, the Federal Government has exclusive capacity to legislate on general rules for all types of bidding and contracting for the direct and indirect Public Administration. In its exercise of this constitutional prerogative, the Federal Government enacted the PPP Act, which institutes general rules for bidding and for contracting Public–Private Partnerships. The general rules contained in the PPP Act (Arts. 1 to 13), under terms of its Section 1, apply indiscriminately to the Federal Government, States, Federal District, and Municipalities, as well as to autonomous entities, public enterprises, joint ventures, and other entities controlled directly or indirectly by the Public Authority.

\textsuperscript{22} Sec. 6, sole paragraph, of the PPP Act: “The contract may foresee the payment to the private partner of a variable remuneration associated with its performance, as per quality targets and standards and the availability defined in the contract.”
Section 14 and subsequent articles of the PPP Act apply specifically to the Federal Government and the entities it controls. As noted in item 2.2, States and Municipalities may draft their own PPP laws to govern the unique features of their local partnership programs, provided that they follow the general rules established by the PPP Act.

3.5. Public–Private Partnership Modalities

The PPP Act selected the administrative concession contract as a public–private partnership instrument, envisaging two different modalities: sponsored concession and administrative concession.

3.5.1 Sponsored Concession

Under the sponsored concession modality, the PPP’s objective is to provide a public service in which part of the concessionaire’s remuneration may come not only from revenues earned from fees charged to users, but also from public counterpart funds (PPP Act, Sec. 2, §2). The latter are limited to 70 percent of the total remuneration received by the private partner, except in the case of a legal authorization to the contrary (PPP Act, Sec. 10, §3). This modality is governed by the PPP Act as well as by the Concession Act, Law No. 8987/95.

3.5.2 Administrative Concession

Under the administrative concession modality, the PPP’s objective is to provide services directly to the Public Administration as user, to society in general, or to a group not subject to individualization or tariff collection (PPP Act, Sec. 2, §2). This modality is governed by the PPP Act as well as by only a handful of the provisions of the Concession Act, i.e., Section 21, 23, 25, and 27 to 39 (PPP Act, Sec. 3). Examples of administrative concessions include PPPs implemented for the construction and operation of prisons, public schools, and Public Administration buildings.

3.6. Objective of the Public–Private Partnership

The PPP’s objective is to provide a service, which must have a minimum period of 5 years and a maximum of 35 (PPP Act, Arts. 2, §4, II and 5, I), and may not be limited to the allocation of labor (Sec. 2, §4, III). The PPP contract usually considers the execution of a public work or the provision of goods as a stage prior to the provision of the service. However, the execution of the work or provision of the good may not constitute the PPP’s sole purpose (PPP Act, Sec. 2, §4, III), nor its final objective, but rather merely an intermediate activity that is incidental to the final objective, i.e., service.

Moreover, the PPP Act prohibits the signing of PPPs for contracts with amounts lower than R$20 million (PPP Act, Sec. 2, §4, I). The value of the possible work to be performed as a stage prior to the service contracted should not be confused with the value of the contract, which should include the sum of projected revenue for the service.

3.7. Guiding Principles for the Contracting of PPPs

The contracting of a PPP is subject to the following principles:

(i) Efficiency in compliance with State missions and in the use of society’s resources (PPP Act, Sec. 4, I). This means that the PPP should be contracted only when its use represents the most efficient alternative for the State in terms of cost-benefit;
(ii) Respect for the interests and rights of end-users of the services and of private entities in charge of their execution (PPP Act, Sec. 4, II). In other words, the PPP’s contracting must balance the interests of users and consumers on the one hand with the legitimate interests of the private concessionaire on the other;

(iii) Non-delegation of jurisdictional duties, of the exercise of police authority, and of other activities exclusive to the State (PPP Act, Sec. 4, III);

(iv) Fiscal responsibility in the signing and execution of partnerships (PPP Act, Sec. 4, IV). In this regard, the continued expenses generated by the PPP should be compensated by ongoing increases in revenue or ongoing reduction of expenses;

(v) Transparency in procedures and decision making (PPP Act, Sec. 4, V). Because the PPP calls for public expenditures, all PPP implementation and management should be transparent to society;

(vi) Objective risk sharing between parties (PPP Act, Sec. 4, VI). The PPP allows and encourages the sharing of risks between public and private partners, thereby assuring the private partner’s right to dispute the contract’s economic-financial balance only with regard to the risks not assumed by it; and

(vii) Financial sustainability and socioeconomic advantages of partnership projects (PPP Act, Sec. 4, VII). Priority should be assigned to those PPP projects with positive social and economic externalities, as well as long-term financial sustainability, through the reduction of public expenses, economic development, or tax generation.

3.8. Public–Private Partnership Contracts

The PPP is an administrative concession contract and as such must meet a series of minimum requirements as envisaged in Sec. 5 of the PPP Act. Mandatory clauses include:

(i) Penalties applicable to the Public Administration and the private partner;

(ii) Risk sharing between parties;

(iii) Means of remuneration and updating of contract values;

(iv) Up-to-date service provision mechanisms;

(v) Events of noncompliance, periods and types of regulation, and making use of guarantees;

(vi) Criteria to evaluate the private partner’s performance;

(vii) Performance guarantees under the responsibility of the private partner;

(viii) Sharing of gains stemming from credit risk reduction; and

(ix) Inspection of reversible assets.
The PPP contract may envisage the conditions under which financiers could assume control of the special purpose entity in charge of carrying the project (“step-in”), as well as the provision of guarantees and payment of amounts directly to financiers by the Public Administration. It may also envisage the use of private conflict-resolution mechanisms, including arbitration, to be carried out in Brazil and in Portuguese, under terms of Law N° 9307 dated 9-23-1996 (Arbitration Act).

3.9. Special purpose entity

In accordance with Section 9 of the PPP Act, the successful bidder is required to establish a Special Purpose Entity (SPE) in order to sign the PPP contract. This enterprise must figure as the entity in charge of implementing and managing the project’s objective.

This requirement, which has become the rule in matters of common public service concessions, is justified by the need to isolate the enterprise resulting from the partnership from risks not associated with the service it provides, including those associated with its controllers’ other business ventures. Moreover, the technique of the special purpose enterprise greatly facilitates the supervision and control of the concessionaire’s activities by the Public Authority and regulatory agencies, since it calls for the mandatory separation of accounting and enterprise functions. It also facilitates the financiers’ possible use of step-in rights, since they intervene solely in a service that is the PPP’s objective at the time of assuming control of the enterprise, and do not become involved in activities unrelated to such service.

The PPP Act does not hinder the SPE from having public sector participation, but it does prohibit the public sector from holding the majority of the enterprise’s voting capital.

3.10. Bidding for Public–Private Partnership

Any Public–Private Partnership must be preceded by bidding in the form of competition (PPP Act, Sec. 10). Prior to its publication, the Invitation to Bid must undergo public consultation for the receipt of comments from interested parties and society in general. At the end of the public consultation period, the Public Administration must reserve at least seven days to analyze comments and make adjustments to the invitation, depending upon the case (PPP Act, Sec. 10, VI).

Public consultation notwithstanding, whenever the bid’s value is over R$150 million, the bidding process must necessarily begin with a public hearing granted by the responsible authority (Law No. 8666/93, Sec. 39).

The PPP Act authorizes phases inversion in the bidding, i.e., the ranking of financial bids prior to the verification of the eligibility requirements, so that only the first ranked bidders will have their qualification documents analyzed (PPP Act, Sec. 13).

The selection of bids may use as a criterion: (i) the lowest value of the public counterpart funds; or (ii) the best bid in terms of the combination of the criterion of lowest counterpayment with best technical proposal, in accordance with weights set forth in the invitation to bid (PPP Act, Sec. 12, II).

3.11. Public Guarantees and their Relevance

In the case of a PPP in the irrigation sector, the SPE established by the private partner shall be in charge of providing the public service of supplying water for irrigation and of O&M of the CUI, acting as concessionaire and obtaining part of its remuneration through fees charged to the users of this service.
(agricultural flagships and their integrated rural producers and other water users), and another portion through public counterpart funds.

Such public counterpayment, which reduces the risks of service demand/market and supply, price fluctuation, fee level, and noncompliance by users, is a mechanism for guaranteeing the sustainability of the service under concession.

These demands and other risks are reduced at the expense of the emergence or intensification of another, i.e., the risk of noncompliance by the Public Authority, due to the lack of available financial resources to honor the counterpayment (public sector credit risk), to the freezing of expenditures (contingency risk), or to the rejection of the contract as a result of a change in government (risk of breach of contract, or more generically, political risk).

Political risk is of particular concern due to the low level of credibility of certain governments, including the Federal Government, and the private investors’ limited inclination to accept it without proper mitigation within the framework of a long-term contract.

Unlike the English model in which the Crown did not need to provide any guarantee, the viability of Public–Private Partnerships in Brazil requires the establishment of guarantees that could help to mitigate the risk of default by the Public Authority.

### 3.12 Guarantee Modalities

In accordance with Section 8 of the PPP Act, the financial obligations contracted by the Public Administration in PPP contracts may be guaranteed by means of:

1. Linkage of future public revenues, as noted in clause IV, Section 167 of the Federal Constitution, which prohibits the linkage of taxes to any purposes, except those specifically foreseen in the constitutional provision itself, none of which is applicable to Public–Private Partnerships in the irrigation sector;
2. Contracting of insurance-guarantee with private insurance companies, depending on the availability of such coverage in the market (Public Authority default);
3. Guarantee provided by international agencies, including political risk insurance;
4. Guarantee provided by a private financial institution, including a bank bond or similar;
5. Guarantees provided by a guarantor fund or state enterprise created for this purpose, as in the case of the Partnership Guarantor Fund instituted at federal level on the basis of Section 16 of the PPP Act, and the São Paulo Partnership Company (Companhia Paulista de Parcerias) in the State of São Paulo; and
6. Other mechanisms permitted by law.

Due to the restrictions, costs, and unavailability of market coverage noted in several of the aforementioned types of guarantees, the Guarantor Fund (PGF) was selected as the key guarantee instrument to support the federal PPP program. In addition to guarantor funds, state PPP programs include state enterprises constituted for or adapted to the provision of such guarantees, as in the case of the São Paulo Partnership Company in the State of São Paulo, the Minas Gerais Development Agency (Companhia de Desenvolvimento Econômico de Minas Gerais – CODEMIG), and the Federal District Planning Agency (Companhia de Planejamento do Distrito Federal) – CODEPLAN.
3.13. The Partnership Guarantor Fund

The Public–Private Guarantor Fund (PGF) was conceived as a private fund, with shares committed by the Federal Government and other public entities, and resembles any other type of investment fund. It should therefore not be confused with public funds that are merely accounting allocations for certain uses, constituting an exception to the principle of revenue universality and management based on a single treasury fund.

Although like any other fund, the PGF has no legal status per se, under its applicable legislation, it has features very similar to those of a corporation, i.e., procedural capacity, defined assets, and legitimacy in providing guarantees and signing contracts in its own name. Moreover, its sole objective is to guarantee the payment of monetary obligations assumed by federal public partners in PPP projects.

In accordance with Section 16 of the PPP Act, the Federal Government, its autonomous agencies, and public foundations were authorized to participate in the PGF with maximum contributions of R$6 billion. Presidential Decree No. 5,411/05 authorized the transfer of certain shares held by the Federal Government in enterprises that it controlled to form the capital of the Guarantor Fund. In compliance with the PPP Act, these are shares that exceed the percentage needed for the Federal Government to retain control of shares. Most of them are shares with high liquidity, and are listed on the São Paulo Stock Exchange.

In addition to contributions in the form of cash and/or shares, the PPP Act also authorizes the conferral of goods for purposes of distributing PGF shares, subject to prior assessment and approval by the President. The goods allowed should be proprietary or special goods, or those for common use that have previously been cleared.

According to the PPP Act, the PGF must be created, administered, managed, and judicially and extra-judicially represented by a financial institution controlled by the Federal Government. In order to achieve the objective of the PGF, the administrative-financial institution is granted prior, irrevocable authorization to liquidate the assets of the Guarantor Fund and to pay the private partner in case of default.

Leveraging of the PGF is not permitted, so it must guarantee obligations up to the maximum limit of the value of its assets. The redemption of shares by Guarantor Fund partners—the Federal Government, its autonomous agencies, or foundations—is allowed up to the limit that has not been committed with guarantees.

The guarantees offered by the PGF may be in the form of a merely personal guarantee—a guarantee granted by the Guarantor Fund—or a real guarantee, in any of its modalities (mortgage, pledge, chattel mortgage, etc.). In addition, the PGF may constitute an asset of public interest, with the objective of separating a portion of its assets and linking it, or the affected asset, to a single PPP project.

3.14. Regulation of the Partnership Guarantor Fund (PGF)

The general guidelines of the PGF were established by Section 16 and subsequent articles of the Law. According to Section 16, the Federal Government, its autonomous agencies, and public foundations were authorized to participate in the PGF.

Decree No 5,411/05 authorized the Federal Government to pay into PGF quotas through representative shares of joint ventures available for sale and not needed for maintaining shareholder control.

Resolution 3,289/05 of the National Monetary Council stipulated that the PGF’s administration could only be carried out by a financial institution that is directly or indirectly controlled by the Federal
Government and authorized by the Securities Commission (CVM) to administer security portfolios, and must comply with the relevant rules of this Commission. This role was assigned to a subsidiary of the state-owned bank Banco do Brasil S.A., the Banco do Brasil Distribuidora de Títulos e Valores Mobiliários S.A. (“BBDTVM”), or, in case of dispute, to BNDES.

Instruction Nº 426/0505 of the Securities Commission regulated the rules applicable to the PGF’s administration and to the administering institution, including the responsibility of submitting to CVM the financial statements and rules of the PGF, disseminating facts that are relevant to the market, not investing in securities it has issued itself, and not entering into any act on behalf of the PGF that is inconsistent with its objectives, as envisaged in the PPP Act. The PGF’s administration is further governed by rules contained in CVM Instruction 306/99.

Administrative Rule 413/05 of the Ministry of Finance authorized the transfer of Banco do Brasil, Companhia Vale do Rio Doce, and Eletrobrás shares to the PGF, with a total market value equivalent to R$2.9 billion, according to the average share price between November 14 and 18, 2005.

On January 27, 2006, a Special Session of the PGF Shareholder Meeting approved its Rules and By-Laws, and considered the initial payment of PGF quotas through shares indicated by Administrative Rule 413/05 of the Ministry of Finance.

The PGF By-Laws highlight the fund’s sole purpose: “to provide guarantees for the payment of monetary obligations assumed by federal public partners through public–private partnerships” (Sec. 6). The By-Laws also envisage two PGF statutory agencies: the Shareholder Meeting and the Advisory Council. The PGF will only provide guarantees in the manner approved by the Shareholder Meeting, which will also consider changes in PGF rules, financial statements, replacement of the administrative institution, merger, incorporation, splitting, transformation or liquidation of the PGF, changes to the administrative fee, investment policy, issuance and underwriting of new shares, approval of asset evaluation opinion, and approval of the outsourcing plan (Sec. 9).

The Shareholder Meeting will not deliberate on the payment of guarantees. The purpose of this rule is to provide the administering institution with greater independence and greater security to private partners that are beneficiaries of the guarantees (Sec. 9, §1). In this regard, the payment of guarantees will be the responsibility of the institution that administers the fund and must faithfully comply with the rules for the liquidation of the guarantee as stipulated in the PPP Act, in the PGF By-Laws, and in the guarantee instrument itself.

In turn, the Advisory Council’s duties will include monitoring the PGF’s performance, presenting its opinion on studies of the guarantees’ feasibility, monitoring PGF management reports, proposing or issuing its opinion about PGF management policies and action strategies, and examining the PGF’s financial statements (Sec. 13).

The PGF will not pay revenues to its shareholders (Sec. 15) and will pursue profitability, security, and liquidity for its assets as an investment policy (Sec. 16).

The PGF By-Laws appoint the BBDTVM as the fund administrator. The administrator will be responsible for managing and disposing of PGF assets, in accordance with the investment policy, proposing to the Shareholder Meeting the most appropriate type of guarantee for each PPP project, analyzing the guarantees’ feasibility, estimating the current value of the guarantees, granting the guarantees approved by the Shareholder Meeting, honoring the guarantees in case of default, and representing the PGF, either plaintiff or defendant, both judicially or extra-judicially, among other duties (Sec. 2).
The By-Laws also reinforce the need for an investment policy that is consistent with the guarantees provided, and the selection of guarantee modalities best suited to the needs of each project and to the characteristics of the assets that comprise the PGF portfolio. The PGF may not leverage itself, that is, the current value of the obligations guaranteed by the PGF may not be higher than the market value of its assets.

3.15. Limitations of the Partnership Guarantor Fund

Although the PGF constitutes a solid, reliable guarantee option due to the liquidity of the assets transferred to it, and to the independence of the administering institution, which will be solely responsible for the decision to honor the guarantees provided in the case of default by public partners, it still has several limitations.

First, according to Section 18, §5, of the PPP Act, the PGF may only be activated 90 days after the maturity of the obligation that has not been paid voluntarily, provided there has been no express rejection due to an act motivated by the public partner. Paragraph 4 of said provision of the PPP Act establishes a period of less than 45 days in case of clear legal credit, represented by liabilities that are accepted by the public partner, but this condition should be very rare in practice, since the bond issued on behalf of the private partner will consist of an invoice not subject to acceptance prior to the maturity date.

Therefore, as a general rule, the private partner should be prepared to wait at least 90 days until it may foreclose its guarantee against the PGF, which may represent, in a situation of total default, a period of up to three months without the entry of new revenue.

The private partner must also be aware of the fact that, in case of express rejection for an act motivated by the public partner, the only remaining possibility will be to resort to the contractually foreseen dispute resolution mechanism (judiciary or arbitration). Upon receiving a favorable and unappealable decision, it may set in motion its guarantee before the PGF. According to this scenario, the delay in dispute resolution may represent a high risk to the private partner, which may be contractually mitigated by means of clear, objective rules regarding the eligibility of public counterpart funds and the calculation of its variable portion, thereby reducing any room left for controversies to a minimum.

Another important limitation of the PGF is the value of its assets, restricted by the PPP Act to R$6 billion, of which only R$3.4 billion (estimated value, subject to variation) had been effectively paid in when the PGF’s By-laws and Rules were approved in January 2006. Considering the large number of projects that are expected to be included in the Federal PPP Program, it is very likely that the PGF may not be sufficient for granting the integrity of monetary commitments assumed by the Public Authority in all these projects. In this case, the Federal Government, through the Shareholders Meeting, will be responsible for prioritizing certain projects in lieu of others, setting a nominal limit for obligations to be guaranteed under each project or a maximum percentage of the total obligations, or limiting the guarantee to a contract period that is shorter than the project’s duration. Under any of these hypotheses, obligations not guaranteed by the PGF will remain.

3.16. Alternatives for Strengthening the Partnership Guarantor Fund

According to Section 18, §2, of the PPP Act, the PGF may offer counter-guarantees to insurance companies, financial institutions, and international organizations that guarantee compliance with the monetary obligations of shareholders under Public-Private Partnerships.

This provision offers the possibility for international agencies, such as the institutions of the World Bank Group—International Bank for Reconstruction and Development (IBRD), International Finance
Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA)—among other multilateral or export promotion agencies (e.g., Inter-American Development Bank–IDB, Overseas Private Investment Corporation–OPIC, etc.), to provide guarantees directly to private partners under the scope of PPPs, taking counter-guarantees from PGF. This alternative may increase the attractiveness of projects for the private sector, as the guarantee provided by these international organizations substantially reduces the perception of risk by its beneficiaries, especially for those less likely to be affected by government risks. On the other hand, assumption of this risk by IBRD, MIGA, or IFC would be within the normal scope of action of these institutions and may therefore be absorbed at a lower cost and with greater efficiency.

The PPP Act and its regulation also do not prohibit other forms of structuring or combining guarantees. Hence, in addition to the alternative mentioned above, the PGF could be combined with guarantees provided by the aforesaid international organizations, so that, for example:

- Guarantees provided by international agencies may guarantee the obligations assumed by the PGF, creating an additional reserve on behalf of beneficiaries;
- Guarantees by multilateral organizations may complement the guarantees provided by the PGF, in relation to the obligations of the Public Authority under the scope of PPP contracts in excess of the capacity of the fund or its assets (limited to R$6 billion); and
- Guarantees by multilateral organizations may complement those provided by the PGF in terms of duration; for example, the PGF may guarantee obligations during the initial 15 years of the PPP contract, whereas those provided by international organizations may be in effect for the remaining period.

The aforementioned guarantees, under the responsibility of international agencies, may be in the form of conventional guarantees or insurance, as in the case of political risk insurance.

3.17 Management of Public–Private Partnerships at Federal Level

The management of PPPs at the federal level was assigned to the Federal Public–Private Partnership Management Committee (PMC), in accordance with Section 14 of the PPP Act and Presidential Decree No. 5,835/05.

The PMC was assigned the following responsibilities: (i) to prioritize services that will be carried out under the PPP scheme; (ii) to regulate procedures for the signing of these contracts; (iii) to authorize the opening of bidding procedures and approve the bidding invitation; and (iv) to evaluate reports on contract performance. The PMC is also responsible for submitting performance reports on PPP contracts to the National Congress and to the Federal Audit Court on an annual basis.

The PMC is composed of representatives and alternates appointed by the Ministries of Planning and Finance, and the Chief of Staff (Casa Civil). The PMC is also assisted by a PPP Technical Commission and by the Economic Advisory Service of the Ministry of Planning, which acts as its Executive Secretariat.

The opening of a bidding process at the federal level for any PPP project is subject to approval by the PMC, upon receipt of a favorable opinion by the Ministry of Planning regarding the project’s merit, and by the Ministry of Finance regarding the feasibility of granting a guarantee and the type, with respect to the risks to the National Treasury and compliance with the expenditure limits contemplated in the PPP Act.
3.18. Restrictions to the Contracting and Financing of Public–Private Partnerships

Financial institutions and other agencies controlled by the Federal Government, such as BNDES, may not finance more than 70 percent of the resources needed by the special purpose entity in charge of carrying out the PPP. This limit will be 80 percent if the project is located in areas of the North, Northeast, and Center-West regions where the Human Development Index is lower than the national average.

In addition, the total contribution of enterprises controlled by the Federal Government and pension funds in the form of capital or financing may not exceed 80 percent of the total resources raised by the SPE, except in the case of projects located in the aforementioned poor regions of the country, where the maximum percentage may be as high as 90 percent.

Finally, the PPP Act prohibits the Federal Government from approving new PPPs if the sum of expenditures incurred the previous year with PPP projects or those projected for the next ten years is higher than 1 percent of the net current revenue verified during the previous year, or projected for the same ten-year period. States, the Federal District, and Municipalities must observe the same limits under penalty of not qualifying for the concession of guarantees or voluntary transfers by the Federal Government.

3.19. Control and Monitoring of Public–Private Partnerships

PPPs give rise to two major concerns: establishing a legal framework that may be successful in attracting private investments for projects with a high social interest on the one hand, and not allowing this legal framework to become an instrument of abuse for using PPPs in projects not justified under this scheme on the other hand, thereby evading the fiscal and procedural restrictions normally imposed on the Public Administration.

Regarding the first concern, there is consensus that the new, more flexible legal scheme introduced by the PPP Act is essential for attracting private investments in priority projects for which there is no room in the public budget and, from the standpoint of common contract schemes, are not economically attractive enough for them to be feasible exclusively through the collection of user tariffs. Greater flexibility is needed so that the State can assume long-term commitments, provide effective guarantees to investors, and make adjustments that meet the level of sophistication required by the complex modern reality. The PPP Act worked well in this regard.

Since no legal system is immune to the risk of shams, the concern about mitigating such a risk is quite relevant. It is therefore of the utmost importance to have instruments of governance, monitoring, and control that assure correctness and efficiency in PPP programs, hampering political misuse and the consequent waste of public assets. These concerns have not gone unnoticed by the PPP Act.

First, the PPP Act establishes a series of principles—including efficiency, transparency, and fiscal responsibility—that will guide PPP programs. Second, the PPP program must comply with budgetary principles. Since these are long-term projects, no project may be implemented without prior inclusion in the Multiannual Investment Plan (PPA) and in the Budget Guidelines Law (BGL). Projected expenditures for the following fiscal year must be accrued by specific budgetary allocations in the Budget Law (BL). Since the Legislative Branch is responsible for approving the PPA, BGL, and BL, prior to this approval there will be an important opportunity for controlling PPP programs.
If PPPs lead to an increase in expenditures over several fiscal years, in compliance with Sections 16 and 17 of the Fiscal Responsibility Act, the PPP program must show evidence of the origin of the resources for its funding, either through a permanent increase in revenues or a reduction in expenditures, in either case guaranteeing long-term budgetary balance.

The establishment of funds or enterprises controlled by the Public Authority, as well as the earmarking of revenues to support PPP guarantees, depends on a specific law, once again requiring legislative oversight. In the case of the PGF, this legislative authorization was granted under the PPP Act itself, thus making a new legal document unnecessary. In any case, the management of this fund under the responsibility of the independent financial institution, the Banco do Brasil, represents a new level of control over federal PPPs.

The PPP Act requires that public consultation be held prior to the bidding procedures for a PPP, thus giving society an opportunity to express its concerns. As an additional condition, it requires the submission of a technical study that demonstrates the project’s appropriateness and timeliness, as well as clearance by the relevant authority confirming compliance with the aforementioned budgetary requirements.

It also calls for the establishment of a management agency—the PMC, in accordance with item 2.17 above—with the objective of selecting the priority projects that will form the PPP program. This agency must submit annual performance reports to the National Congress and to the Federal Audit Court. In addition to the selection carried out by this management agency, the PPP program will be subject to internal control by the Public Administration and by sectoral ministries, and monitoring by regulatory agencies. The ministries and regulatory agencies will be responsible for forwarding a detailed report on the execution of PPP contracts to the PMC every six months.

Internal controls carried out by the Administration itself notwithstanding, monitoring by regulatory agencies, and the legal framework and implementation of PPP programs—including the selection of projects, and their structuring and execution—will be subject to external control by the Legislature, to be carried out with the technical assistance of the Audit Court. It should be noted that this external control may involve aspects such as the cost-effectiveness and timeliness of PPP projects, which may lead to the suspension of acts of the Executive Authority.

Finally, the PPP Program and the projects implemented within its framework will be subject to the control that the Department of Justice (Ministério Público) and the population itself may exert by means of a public civil action and a popular action, respectively.

3.20. Administrative Rule 614 of the National Treasury Secretariat—Public Accounting Rules

On August 21, 2006, the National Secretariat of the Treasury issued Administrative Rule no. 614, one of the last pending federal rules to complete the regulatory framework applicable to Public-Private Partnerships at the federal level.

In brief, the Administrative Rule establishes rules on whether the granting authority should recognize the PPP project in its public accounting as a true PPP service agreement (thus generating current expenses for the granting authority throughout the agreement by the private party), or whether the PPP should be accounted for as a disguised financed purchase transaction, in which the Granting Authority is actually contracting and receiving public works in the short term, but paying for them in deferred installments. In the later case, the Administrative Rule requires that the Granting Authority recognize the public works or assets allocated to the PPP
concession as public assets, while also recognizing a debt in the same amount as these assets in the government financial statements.

Under the strong influence of Anglo-Saxon rules, the Administrative Rule invoked the Brazilian legal tradition establishing rules that grant priority to the economic aspects of PPP contracts as opposed to their mere language format (substance over form). This position is illustrated by the establishment of tests that must be applied to each PPP transaction in order to verify if the risks and rewards relating to a certain project are allocated mainly to the public or private partner. If the tests show that a substantial part of the risks are borne by the public partner, it must consolidate the assets related to the project in consideration of the related debt in its financial statements.

The tests include verifying the assumption of a substantial part of the demand, construction or availability risk from the public partner’s perspective. As a parameter, the rule adopted objective criteria establishing that a substantial part of the risk is any amount exceeding 40% of the total risk. Although there is still some doubt regarding the evidence and measuring of each type of risk, the clear verification of at least one risk borne by the public partner is condition enough for them to consolidate the assets and debts in their financial statements.

The Administrative Rule only exempts the sponsored PPPs from the general rule. Besides not allocating a relevant part of the construction or availability risk to the public sector, they do not foresee fixed counterpayments to the private partner regardless of their actual use of the services and performance.

As a mechanism for reducing the liabilities to be registered by the Public Power, the Administrative Rule allows that the value of the collateral granted by guarantor funds or other guarantor entities be deducted from the amount of liabilities to be consolidated by the public entity, provided that such collateral is separate from the public entity assets themselves.

The Administrative Rule also requires recognition in the accounts of the public entity of a liability for “the amount equivalent to risks borne due to commitments assumed for the benefit of the private partner or for its own benefit” (art. 7th), determining that such liability must be quantified, considering the probability of the materialization of the underlying risk and the maximum value of the loss.

All these rules greatly restrict the capacity of public entities to enter into new PPP agreements or to obtain loans, since the consolidated debts are taken into consideration in the overall level of indebtedness of the public entity and are therefore subject to the limitations set forth in the Fiscal Responsibility Act.

<table>
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<th>The Brazilian Public–Private Partnership Experience</th>
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<tr>
<td>Law No 11079/04—the Federal Law governing Public–Private Partnerships (PPPs)—had already been in effect for four years by the end of 2008. Law No. 14868/03 of the State of Minas Gerais, the precursor of</td>
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PPPs in the country, had been in effect for five years by the same date, followed closely by the legislation of the State of São Paulo. Since then, implementation of the first PPP took a great deal of time and effort.

The delay in implementing PPPs is normal, however. Even in England, where PPPs first emerged and were a great success, very few projects were implemented the first years: one was implemented in 1987, none in 1988 and 1989, and only two in 1990. It is therefore reasonable to expect that the implementation of the first Brazilian projects would take time. In Brazil, structures must be more complex and guarantees must be more concrete in order to compensate for the government’s reduced credibility and budgetary capacity, not to mention the political instability as experienced in 2005 and during the 2006 electoral period for example.

In the State of São Paulo, the invitation to bid for Line 4 of the São Paulo Subway was finally published on December 22, 2005, following a public hearing and consultation establishing March 2006 as the deadline for bid submissions. However, the Audit Court of the State of São Paulo suspended the bidding process so that adjustments could be made to the invitation, and the process could only start up again the second half of 2006.

The Line 4 Project of the São Paulo Subway was designed in accordance with the Federal PPP Act and São Paulo State Law No. 11.688/04. It was designed as a PPP under a sponsored concession modality in which a substantial part of the revenues of the private partner in charge of the Line’s operation and maintenance, as well as funds for supplying rail equipment, stem from user fees. The state government complements these fees if they are no longer in line with the reference fee (R$2.08 per passenger as of February 2005). This is to be corrected by the average between the IGPM and IPC-FIPE indexes the first 15 years of operation, and only by the IPC-FIPE thereafter.

In addition, the bidding document also contemplated an additional public counterpayment to the private partner, to be divided into 48 installments and limited to R$120 million. The bidding for the Line 4 Project finally took place on August 9, 2008. The bid proposing the lowest counterpayment was offered by a consortium led by Companhia de Concessões Rodoviárias - CCR, which called for an additional public counterpayment of R$75 million. The second ranked bidder, a consortium led by a Brazilian subsidiary of Alston, asked for a counterpayment of R$95 million.

Line 4–Yellow of the São Paulo Subway, within the framework of the São Paulo State PPP Program, constitutes a landmark in the history of PPPs in Brazil: it is the first PPP project to be opened to bidding and awarding.

In 2008, the Concessionaire of Subway Line 4 succeeded in obtaining international project financing from IDB and its B-lenders.

Following the Line 4 Project, the São Paulo State Basic Sanitation Company ([Companhia de Saneamento Básico do Estado de São Paulo – SABESP]) entered into a PPP concession contract with CAB – Sistema Produtor Auto Tietê S/A, the special purpose entity incorporated by Galvão Engenharia S.A. and Companhia Águas do Brasil – CAB Ambiental. The contract became effective as of August 18, 2008, also after a long tendering process. Under the PPP contract, the special purpose entity is responsible for the capacity expansion and maintenance works of the Sistema Alto Tietê – a water impounding and treatment station.

At the same time, the State of Minas Gerais published an invitation and the contract for the first PPP in the highway/toll road sector, consisting of the recovery and maintenance of Highway MG-050. The invitation was published on April 12, 2006. MG-050 was also structured as a sponsored concession: the remuneration of the private partner includes tolls—set at R$3.00 per toll station—plus an additional counterpayment limited to R$30 million per year and guaranteed by CODEMIG, the state-owned
company acting as guarantor. CIBE Participações e Empreendimentos S.A. won this sponsored concession by proposing the lowest public counterpayment to recover and operate 372 km of roads within the State of Minas Gerais.

On April 19, 2006, the State of Bahia published its first PPP invitation, this time in the basic sanitation sector, to bid for the construction, operation and maintenance of the Jaguaribe Oceanic Discharge System (including an underwater outlet). The project, contracted by the Empresa Baiana de Águas e Saneamento S.A. (EMBASA), was the first PPP under the administrative concession modality, whereby service is delivered directly to the Granting Authority from which 100 percent of all remuneration to the private partner will derive. This counterpayment would be made in the form of allocations of receivables held by EMBASA to the private partner. Construtora Norberto Odebrecht won the bid for carrying out such a PPP concession.

Two PPP projects are being implemented in Pernambuco. They are the construction and operation of a toll road system, which includes a toll bridge – the Ponte Paiva Road System, currently managed by a special purpose entity incorporated by subsidiaries of the Odebrecht Group; and the construction and administration of a penitentiary. The latter is the first Brazilian PPP concession granted to a private party in the very sensitive field of prison management services. Minas Gerais has announced that it is concluding studies for launching a PPP project in the same field.

At the federal level, some projects have been announced but not yet completed. A project for the recovery, maintenance, and extension of the Bahia segment of Highway BR-116 (studied under an agreement signed by the Ministry of Planning, BNDES, and IFC) was a candidate for the first federal PPP. However it was then tendered as a traditional concession. Another strong PPP candidate, the North-South Railway, was withdrawn from the PPP program because it was considered feasible under the common public service concession scheme, with greater responsibilities for the private sector and lower costs for the public sector. Finally, the Banco do Brasil and Caixa Econômica Federal - CEF Datacenter – an administrative concession for the construction and operation of a data center to hold relevant electronic data from both Banco do Brasil and CEF in the Federal District, Brasilia - had to be reformulated and was re-submitted for public consultation in October 2008. By the end of 2008, the bidding documents had not yet been officially published.

In the irrigation sector, as presented earlier in more detail, four Public Perimeters were selected as priorities and included in the 2004–2007 PPA. MIN invited private parties to carry out and propose feasibility studies for three PIPs. Studies for all of them – the Pontal Project, the Baixio do Irecê Project and the Salitre Project – were delivered. The Pontal Project is under public consultation and the other two are awaiting the necessary public review of the delivered reports.

It is worth noting that while the Federal Government is not able to tender its own PPP projects, it has been participating in Brazilian PPPs either by means of financing, through BNDES or other government-controlled financial institutions, the projects themselves (as is the case of two basic sanitation PPP projects in the cities of Rio das Ostras and Rio Claro, financed by BNDES, and the Paiva Bridge PPP in Pernambuco, financed by Banco do Nordeste - BNB), or through studies that allow a future tender of the projects.

A number of PPP projects that are being studied in Brazil include the most diverse services that may be delegated, ranging from roads to football stadium concessions.

All of the foregoing experiences show that the PPP regime is becoming an important reality in Brazil. A few important PPP projects have already been awarded by certain states and municipalities and should
therefore pave the way for many more to come, including at the federal level. However, the infrastructure bottleneck experience in Brazil and its expected rate of growth would speak in favor of the broader and faster dissemination of the PPP regime.

Experience has shown that the most relevant constraint for implementing more PPP projects is the Government’s lack of resources and expertise in setting priorities and identifying potentially good projects. It is consequently unable to carry out preparatory feasibility activities in an expeditious and efficient manner, and to draft suitable documentation and model concession agreements for bidding. Although the PPP legal framework allows private parties to prepare and submit propositions for relevant PPP projects to the Government just like the common concessions, its necessary revision process tends to be complex and time consuming.

International Experience with Public–Private Partnerships

The 1990s were marked by a sharp increase in the private sector’s involvement in the development and financing of physical infrastructure, services, and technologies worldwide. These ongoing activities have been taken a step further with the design of models in which the public and private sectors can share the risks and benefits associated with activities that are of interest to society.

The expression Public–Private Partnerships (PPP), in its more innovative sense, was conceived in England in the early 1990s, and has been successfully adopted by a number of countries such as Portugal, the Netherlands, Germany, Ireland, Finland, Italy, Poland, Spain, Austria, Denmark, Hungary, Belgium, Switzerland, South Africa, and Canada. In Latin America, the cases of Mexico and Chile are noteworthy. In Brazil, the public–private partnership process began at the turn of the century with the studies that led to the Federal PPP Act dated 12-30-2004, and to various state and municipal laws on this topic.

In the case of Brazil, the political-strategic system prior to the PPP Act led the private sector to act in a non-proactive manner, except when forming an opinion about investments that were of interest to the government sector. The State dealt with the initial studies, commissioning project designs, bidding invitations, contracting the private sector to execute the work, and the installation of infrastructure of interest to society in general. In this scenario, the private sector made few commitments and took few risks, which were limited to default within the physical-financial timetables and renegotiations of contracted values.

In the specific case of public irrigation projects, the suspension of the public financing of infrastructure works, starting in 1990, coincided with the global movement toward the public–private partnership concept. While the average amount of US$10,000 per potentially irrigable hectare was questioned with regard to the possible returns that these investments could represent, numerous attempts were made to overcome the impasse between those who alleged that irrigation was too expensive and those who believed that it was a true panacea for Brazil’s Northeast and Semi-Arid Region.

One of these attempts was the result of an agreement reached by Brazilian and international institutions on promoting a study of the impacts and externalities stemming from social investments made within public irrigation perimeters (PIPs). This study, which was conducted by the World Bank\(^{23}\), found that investments in irrigation are an excellent strategic option for the region’s social and economic development, contributing to the promotion of a more dynamic and diversified economy, increasing \(^{23}\) World Bank, Report N° 28785-BR: Brazil. Irrigated Agriculture in the Brazilian Semi-Arid Region: Social Impacts and Externalities. April 26, 2004.
regional GDP and per capita income, generating stable employment, retaining migrants, and improving infrastructure and public services such as education, health, and sanitation. In addition, the study found that the investment cost per job created in irrigated agriculture is significantly lower than the average observed in other economic sectors.

Thus, the renewed interest in this type of project has taken two different directions. The first pertains to the efficiency, efficacy, and effectiveness of existing projects, playing a new role in leveraging the regional sustainable development process; and the second involves making use of the experience of other countries and institutions to improve the concept of Public–Private Partnerships and in irrigation management transfer.

The use of lessons learned and strategic planning procedures leads to an examination of international experiences that can be applied to national projects from two different perspectives: (i) as a model that addresses the relationships that are inherent to the purpose of the partnership; and (ii) the resulting thematic issues. In the first case, experience is scarce and of little relevance. In the second, many of the issues faced are common to any partnership project, while others must be developed according to the specific nature of the irrigated agriculture segment or subsector.

International experience has made some relevant contributions in this area. Following a long period of considerable private participation in infrastructure projects for transportation, water, energy, and telecommunications, with peak investments having been made around 1997 (some 2,500 projects), there was a steep decline in private investments, particularly in Latin America. This was the result of sluggish improvements in contractual relationships between parties, and conflicts that arose during the implementation of partnership projects, causing a large number of projects to be transferred to the governmental sphere.

Consequently, one of the key points in this type of contractual relationship pertains to the capacity to renegotiate the originally established contract conditions. The parties to the contract must be open and receptive to this process of adjusting and improving the relationship between the partners. The process of designing and developing options for private participation requires flexibility in order to find a better scheme or model and to identify the best private partner for irrigation projects/perimeters. It is also important to have information, follow-up, monitoring and evaluation systems in place to provide decision makers with indicators and benchmarks that are transparent, credible and of sufficient quality to deal with contractual agreements stemming from the dynamics of these projects.

The importance of a well-structured, strengthened regulatory agency that can reduce uncertainties and act as a barrier to opportunistic political intentions should not be underestimated. The regulatory agency will be much more effective if it participates in negotiations from the very beginning. The work carried out on infrastructure concessions in Latin America is an example of the concern regarding the limits and risks faced by companies by complying with loans and financing contracts to meet the partnership’s objective. This includes situations such as changes in government and the possibilities of successive negotiations. According to the same work done between 1997 and 2000, 15 contracts were renegotiated in the transport sector and 21 in the water sector.

Another important parameter was the number of renegotiations caused by government elections. A sample of 307 projects showed a high concentration of changes requested by the government immediately after the first election (79 percent of the total) during the contract period, whereas requests from the private sector for renegotiations were spread over the entire period, regardless of elections.

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International experience to date is illustrative but not necessarily enlightening for structurally complex programs that demand investments in shared common-use infrastructure. These are strictly associated with investments in infrastructure for private use, as in the case of large-scale irrigated agricultural projects. Relevant issues, such as the objectives of the private investor, management of market, commercial and political risks, financial instruments and analyses, and opportunities and criteria/needs for the renegotiation of ongoing partnerships are only a few of the points being studied by companies, educational and research institutions, financial agents, insurance/guarantor agencies, and experts in various fields.

From an operational standpoint, a relevant issue is the mitigation of two types of risk: market/commercial and political. In project finance schemes, risks are usually attributed or allocated to the partner most qualified to manage them. The mitigation instruments incorporated in contracts and financial arrangements refer to construction, operation and maintenance periods, and the implementation period of the partnership’s key objective: productive arrangements. Risk management, in this case, goes along with the concepts of project management and management by projects.

The adoption of PPPs should bring advantages and greater efficiency than other forms of private sector contracting, providing results that can be measured by society. It is “value for money.”

Another lesson is that an environment favorable to new PPP investments requires a regulatory framework as well as experience, and a PPP culture that can only be achieved with the implementation of the first projects. It is therefore essential that pilot projects be properly selected from among those that have the most social appeal and best highlight the advantages of PPPs, so that other projects may follow them in a geometric progression.

4. PPP MODELS FOR THE IRRIGATION SECTOR

4.1. Brief Diagnosis of the Traditional Public Irrigation Project Model

4.1.1 2004 Report

According to the World Bank study “Brazil: Irrigated Agriculture in the Brazilian Semi-Arid Region: Social Impacts and Externalities” – Report No. 28785-BR, dated April 26, 2004, irrigation projects implemented or under implementation until 2004 in the Brazilian Semi-Arid Region covered a total area of about 500,000 hectares, including public settlements and private lands. Of this total area, about 200,000 hectares received public investments of around US$2 billion over the past three decades, but 140,000 hectares continue to produce far less than their potential. The Brazilian Government began the implementation of public irrigation schemes on 70,000 new hectares, but most of these schemes are paralyzed due to budgetary restrictions and the need to reformulate the model used in these projects.

The 2004 report focused on eleven projects distributed throughout five irrigation hubs located in the states of Minas Gerais, Bahia, Pernambuco, Ceará, and Rio Grande do Norte, totaling an irrigated area of some 85,300 hectares. In 2002, 63,800 of these were evaluated by their respective farmers as being unproductive, whereas the remaining 21,500 hectares were still waiting to be settled. The study was based on economic-financial, socioeconomic, and institutional outlooks.
At that time, it was found that only four of the 11 projects were profitable from an economic-financial standpoint. All of them were located in the Petrolina-Juazeiro region. Of these four projects, two had been designed as pilot projects under a cooperation agreement with the Food and Agriculture Organization of the United Nations (FAO). The remaining seven projects were found to be quite deficient.

A representative example was the Jaíba Project in Northern Minas Gerais, designed to cover 100,000 hectares of irrigated land. The Public Authority spent US$268 million on infrastructure that remains underused. Fifteen years passed between the project’s initiation and when the first farmer was settled. Another 13 years have gone by since then and only 8,500 hectares (less than 10 percent of the originally projected area) were in use in 2004.

Another notable project, the Morada Nova Project in Ceará, has shown a deficit since its conception in the 1960s, with excessive paternalism towards settled farmers who have been unable to adapt to the needs of the agricultural market due to a lack of technical assistance and training. In contrast, the few areas developed by the private sector in the region where these projects are located have shown a substantial surplus.

From a socioeconomic standpoint, the 2004 report concluded that although most of the projects showed a deficit, they served the purpose of creating new jobs and thus contributed modestly to the socioeconomic development of the region and its population. In general terms, the 2004 report showed that irrigation projects in the Semi-Arid Region, with the exception of a handful of high-performing projects in the Petrolina and Juazeiro Region, experienced several key problems, including:

(i) oversized and consequently underused;
(ii) shortcomings in planning the projects and their supporting logistics, including the transport of products to the market;
(iii) constant, prolonged delays in project design and execution;
(iv) lack of technical assistance and training for settled farmers;
(v) inadequate selection of farmers for settlement purposes;
(vi) farmers’ lack of access to markets;
(vii) lack of prioritization in public irrigation expenditure, as shown by the high number of unfinished or underused projects, compared to a handful of projects that have either been concluded or are ongoing; and
(viii) uncertainties and difficulty in obtaining financing due to a lack of land titling and relevant water rights.

The 2004 Report also concluded that purely private initiatives, although healthy, will only be carried out in irrigation if infrastructure investments can be made at low cost. The participation of the public sector as financier will be essential wherever large investments in infrastructure are necessary to facilitate an irrigation project.

4.1.2 The Traditional Model
Public irrigation projects in the São Francisco and Parnaíba valley region are the responsibility of CODEVASF (São Francisco and Parnaíba Valleys Development Company), a federal public enterprise established by Law No. 6088/74\(^\text{25}\) and currently affiliated with the Ministry of National Integration. Originally created to operate only in the São Francisco Valley, the scope of CODEVASF was expanded to the Parnaíba River Valley by Law 9954 of 1-6-2000.

According to the public model that has been in effect in recent decades, CODEVASF expropriates areas subject to public irrigation projects, is responsible for obtaining all environmental licenses and water use grants, invites the private sector to bid on the construction of common-use infrastructure, assumes the full cost of this work through budget resources whether or not linked to specific public debt, and takes full responsibility for operating and maintaining this common irrigation infrastructure.

Furthermore, with the objective of promoting the social development of needy local populations, CODEVASF selects and settles small-scale farmer families on family plots within irrigated areas,\(^\text{26}\) subsidizing the cost of the water supplied and on-farm investments, and providing other types of technical and financial support.

However, the settlement promoted by CODEVASF brings together farmers (known as irrigator or irrigation farmers\(^\text{27}\)) with different levels of training, financial capacity, and crop plans, and the model contains no elements that efficiently promote integration among them. Consequently, the perimeter is developed in a disorderly and inefficient manner.

In exchange for distributing water, CODEVASF is authorized to charge a tariff composed of two factors: \(K_1\) and \(K_2\). The former is used to cover the amortization of the investment made in common-use infrastructure, and the latter covers the costs of administering, operating, and maintaining the infrastructure (Sec. 43 of Decree 89.496/84). However, levels of default are extremely high and CODEVASF often has to waive the payment of \(K_1\) tariffs.

Although CODEVASF normally assumes initial responsibility for the operation and maintenance of common irrigation infrastructure, recognizing the need and appropriateness of greater private sector participation, it seeks to gradually transfer this responsibility to irrigators as they reach a certain level of development. Once the co-management and self-management stages are completed, the final objective is the perimeter’s emancipation, i.e., the self-sustainable operation and maintenance of common-use infrastructure at the irrigators’ expense and risk, without CODEVASF’s participation.

Moreover, with regard to emancipation, Decree 89.496 dated 3-29-1984, which regulates Law 6662/79, stipulated that “emancipation shall proceed upon verification that essential infrastructure works have been completed, at least 2/3 (two thirds) of the irrigators have been settled, and the community is socially and economically ready to develop itself, with an internal organization that assures its administrative

\(^{25}\)“Sec. 4. The purpose of CODEVASF is to use the water and soil resources of the São Francisco Valley for agricultural, livestock, and agro-industrial purposes, either directly or through public and private entities, promoting the integrated development of priority areas and the implementation of agro-industrial and agricultural and livestock districts. To that end, it may coordinate or execute, either directly or by means of contracts, infrastructure works, particularly for diverting water for irrigation, construction of primary or secondary channels, and for basic sanitation, electrification and transportation works, in accordance with the Steering Plan and in association with relevant federal agencies”.

\(^{26}\)Law No. 6.662/79 (dealing with the National Irrigation Policy). “Sec. 15. The family plot, whose dimension should correspond to the minimum area of production that can ensure the economic and social promotion of the irrigation farmer and his family, constitutes resoluble and indivisible property, in accordance with this Law”.

\(^{27}\)Law No. 6.662/79. “Sec. 26. The irrigator, for purposes of this Law, is considered to be the individual or legal entity dedicated, in a certain irrigation project, to working an agricultural plot, of which he/it is the owner, promissor/purchaser, or concessionaire of such land’s use”. 
ability and autonomous commercial activities (Sec. 9º, §2º). The operation of common irrigation infrastructure in the emancipated perimeter or under self-management is thus entrusted to irrigators in the form of an Irrigation District.

In principle, irrigators are responsible for installing on-farm irrigation infrastructure, i.e., on their respective plots, and for any other necessary improvements. However, under the paternalistic model for the settlement of individual irrigators on family plots, the Public Authority has fully subsidized these costs with the hope of being reimbursed when projects mature (Sec. 24, Law 6662/79). Thus, the irrigator is responsible for farming the land itself.

Despite CODEVASF’s efforts, the public irrigation model described above shows a series of shortcomings, resulting in projects that are mostly deficient, underused, and with socioeconomic externalities that are positive but far from what they are capable of achieving. As anticipated and confirmed by previous studies such as the World Bank’s 2004 Report, this negative scenario is largely due to the Public Authority’s inability to implement projects swiftly, especially in light of budget limitations and uncertainties; its inability to provide technical assistance and training to irrigators consistent with agro-industrial market needs; excess paternalism; and lack of integration with agribusiness companies; among other factors.

The model is clearly not achieving its economic and social objectives and should be reformulated in light of more efficient models.

4.2. Agribusiness as the Basis for a New Model

Although it would have been praiseworthy to implement public irrigation projects with a strong social focus through the settlement of small farmers on family plots, with priority being given to local families, experience has shown that this model has achieved only meager results. In fact, this assistance-based model is revealing an odd combination of factors: large public investments with small social and economic returns.

The low level of training for small farmers and the lack of access to technical and financial resources have hampered their effective participation in the agribusiness chain and in competitive markets, thus condemning them to subsistence farming and constant dependence on the Public Authority. In light of this situation, consensus was built within the Public Authority itself regarding the need to reformulate this traditional model for public irrigation projects, a model that clearly has not been able to produce social and economic results in accordance with the enormous potential of irrigated agriculture.

Based on the most recent studies on this subject, and especially on the successful experience of a handful of projects that achieved better results, it is acknowledged that public irrigation projects cannot do without the participation of agribusiness companies that can introduce more modern, efficient irrigated farming techniques, benefit from economies of scale, join the agro-industrial chain as a means of adding value to agricultural products, develop efficient distribution channels, access worldwide consumer markets, and obtain credit and financing at viable, competitive costs.

As is well recognized by the Irrigation Act and the Irrigation Bill, the implementation of Public Irrigation Projects aimed at agribusiness companies may also serve the public interest, as long as such a configuration, according to the characteristics of each project, shows itself to be more apt to promote the economic and social development of the respective regions and their populations.
Even the social concern about small local farmers may be addressed by generating direct and indirect jobs for them, or through their direct integration in the productive chain of agribusiness companies, so that they can thus act as flagships of integration.

4.3. Legal Justification for PPPs and CDRUs in the Irrigation Sector

It appears undeniable that the traditional model of Public Irrigation Project implementation and management has not been yielding results commensurate with the potential of irrigated agriculture in terms of economic or social development. It is also known that the redesign of this deficient model must be based on private investment, in order to free such projects from the uncertainties and inefficiencies of public budgets; and on agribusiness logic, to ensure the economic sustainability of projects and their inclusion in global markets. The intended reformulation in the irrigation sector is consistent with the reform that Brazil has been undergoing, especially over the past decade, in line with international development and in light of the guiding principles established in the 1988 Federal Constitution.

According to the State-subsidiary principle (Federal Constitution, Sec. 173),\textsuperscript{28} as opposed to the State-interventionist principle, economic or entrepreneurial activity must be left predominantly to the private sector, and the State should be involved in the economic sector in a supplementary manner only when the private sector’s involvement is not sufficient enough to meet certain collective interests. The State is responsible for promoting economic activity, in addition to regulating those sectors considered to be of greater social relevance.

In this context, the question is: which model is best suited to the reality and needs of irrigation projects?

There are two very different activities in irrigation projects: (i) the construction, operation, and maintenance of common-use infrastructure to supply water for irrigation, i.e., the irrigation service; and (ii) agricultural production per se, made feasible or enhanced by irrigation.

4.3.1 The Irrigation Service

According to Law 9074/95 (Sec. 1, V),\textsuperscript{29} the irrigation service is classified as a public service, given its essential nature and public relevance. It will not be classified as such if the irrigation infrastructure is implemented by the irrigator himself in his own private interest, or for essentially private projects. As a rule, however, within the framework of public irrigation projects which, by definition, are aimed at serving a group of stakeholders, the irrigation service shall be classified as a public service and, as such should be provided by the Public Authority either directly or by means of a concession or permit, according to Section 175 of the Federal Constitution\textsuperscript{30}.

Considering that one of the main reasons for the deficiency of the traditional public irrigation project model has been the State’s inability to deliver or make irrigation services directly available in an adequate, efficient, and self-sustainable manner, a new public irrigation project model undoubtedly assumes the participation of the private sector in making the necessary investments for the construction

\textsuperscript{28} FC, “Sec. 173. Except for the cases set forth in this Constitution, the direct exploitation of an economic activity by the State shall only be allowed when required for meeting imperative national security needs or serving relevant collective interest, as defined by law.”

\textsuperscript{29} Law No. 9074/95. “Sec. 1. The following services and public works that are the responsibility of the Federal Government shall be subject to concession schemes or, when appropriate, to permit schemes, as per Law No. 8,987 dated 2-13-1995. (...) V—exploitation of federal civil works such as dams, containments, locks, dikes, and irrigation, whether or not preceded by the execution of public works.”

\textsuperscript{30} FC, “Sec. 175. It is incumbent upon the Government, as set forth by law, to provide public utility services, either directly or by concession or permission, which must always be through public bidding.”
and implementation of a common irrigation infrastructure, as well as its efficient operation and maintenance. In accordance with the aforementioned legal and constitutional provisions, this private sector participation should take place under a public service concession.31

According to current legislation, the concession of public services permits two basic modalities: common concession of public services, governed by Law 8987 of 2-13-1995, and concession under a public–private partnership scheme, governed primarily by Law 11079 of 12-30-2004.

In common public service concessions, the concessionaire takes over the delivery of the public service, as well as the corresponding public works, in exchange for collecting tariffs directly from service users. The service must be provided in an adequate, continuous, and efficient manner during the contract period, which must be compatible with the volume of investments and the period required for its amortization.

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In the case of concessions under a public–private partnership scheme (PPP), the concessionaire remains obligated to provide the service in an adequate, continuous, and efficient manner during the contract period, as well as for carrying out all works required for providing the service, but in exchange for a periodic counterpayment by the Granting Authority while the service is being provided. Under the PPP, such counterpayment may represent the concessionaire’s full remuneration (PPP, subspecies administrative concession) or a complement to the tariff charged directly to users (PPP, subspecies sponsored concession).

In both cases, the objective of a specific counterpayment to PPPs is to make a project economically feasible that would otherwise not be self-sustainable under the traditional concession scheme, and therefore not allow private management.

It is clear that, although the PPP contributes to the attractiveness and feasibility of a project, the scheme is based on the assumption of significant financial commitments by the Granting Authority. These commitments would not need to be assumed under a common concession.

Therefore, whenever the concession of a common public service is feasible, under which the State does not assume financial risk but instead transfers the full risk of remuneration to the private sector, preference should be given to this solution over the PPP. However, experience shows that common concessions are only a feasible alternative for those public irrigation projects that do not require major investments by the private concessionaire; for example, when the common irrigation infrastructure has already been completed through public investments.

As a rule, public irrigation projects that still depend on large investments for the construction and implementation of common irrigation infrastructure will not be feasible through the mere collection of tariffs from users because there is a limit to the amount of tariffs that may be charged to irrigators without

31 We disregarded the permit figure because of its uncertainty and consequently its incompatibility with public irrigation projects, which require high investments, long amortization terms, and therefore much clearer and more stable rules that are specific to a concession contract. Thus, the Public Service Concession Law itself (Law No. 8,987/95) defines a permit as “the delegation, under uncertain title, by means of public bidding, of the delivery of public services, by the Granting Authority to the individual or legal entity who/that demonstrates the capacity to perform it, at his/its own risk”. In addition to the uncertainty, the law also does not allow a permit for the exploitation of services that must be preceded by public works under the responsibility of the private entity, since this possibility is reserved for the concession scheme. A delegation, which is often adopted under the traditional model of public irrigation projects on behalf of an irrigation farmer association or district, based on Section 9, §3, of Decree 89.496 dated 3-29-1984 (which regulates the Irrigation Act), has been shown to be inappropriate for projects that demand prior investments in infrastructure or that contemplate the delivery of services by an entity different from the irrigation farmers themselves. In addition, the emancipation model based on delegation to small irrigation farmer associations is one of the bases and the source of shortcomings under the traditional model that needs to be redesigned.
jeopardizing the competitiveness of their agricultural production. In such cases, the PPP appears to offer the best solution, notwithstanding a more detailed analysis in light of the characteristics of each project.

Therefore, due to the relevant commitments that must be assumed by the State in PPPs, especially financial ones, the conclusion is that the adoption of a PPP will only serve public interest. Moreover, it will only be legitimate and justified if all alternatives for the contracting of the private sector by the public sector have been evaluated in relation to a certain project, including the concession of common public service, and if the PPP remains the only feasible alternative or at least the one that can achieve the best results in exchange for the lowest public investment.

Nevertheless, PPPs clearly offer a rather interesting alternative, and probably the most advisable one, for public irrigation projects that still require a large volume of investments, due either to the enormous deficiencies in the traditional implementation model under the near-total responsibility of the State, or to the impossibility of attracting the private sector to projects based on the common concession scheme or other schemes that do not guarantee their economic sustainability.

4.3.2 Agricultural Production–Irrigated Agriculture

Agricultural production is an economic activity of the agro-industrial production chain and, as such, must be exploited, as far as possible, by the private sector at its own expense and risk, with a view to fulfilling the social function of land. This is also an activity that is quite different from the irrigation service itself, due not only to the applicable legal scheme (which, in the case of agricultural production, is not a public service at all), but also to its characteristics, associated risks, and the profile of investors.

Thus, a new model for the implementation of public irrigation projects must contemplate an integrated scheme for the development of the irrigation service and for agricultural development within the irrigated perimeter, taking into account the specific nature of each activity. The Irrigation Act (Sec. 12), which in this regard is fully consistent with the logic of public interest, requires that public irrigation projects and their irrigated perimeters must be primarily implemented on publicly owned lands that have been either reserved or acquired for this purpose (see also Sec. 20 of the Irrigation Bill).

In the case of projects implemented on public lands, the granting of these lands for private sector development should take place under an appropriate legal scheme. Applicable schemes include: (i) the alienation of land ownership by the Public Authority to irrigation farmers, resolutory and linked to its use; (ii) the leasing of land; (iii) the cession of use; (iv) the assignment of use; (v) the concession of the right in rem to use; or (vi) the incorporation into the social capital of companies whose objective is irrigated agriculture. Alienation, lease, assignment, or concession may take place on behalf of a family irrigator or company, including agribusiness companies which, as noted, shall constitute the basis for the new model.

Due to the characteristics of the new model that is to be implemented—greater participation of the private sector, concession of the irrigation service through PPPs or common concession, and agribusiness logic—we will focus the present study on the concession scheme for usage rights, which appears best suited to current circumstances.

Considering the public nature of the irrigation projects being analyzed, it is advisable for the Public Authority to maintain ownership of the land in order to benefit from its valuation in the long run, to which it will contribute substantially, especially under the PPP regime. This will also help to ensure that the land may be taken back more easily in case of deviation from its purpose or from the conditions that have set the basis for the granting of ownership to the concessionaire (the agricultural enterprise). In fact, among the main reasons for the failure of public irrigation projects under traditional models has been precisely
the difficulty in preventing deviation from purpose and the unauthorized transfer of land, or in taking it back after the private owner receives title to the land.

Under the right-to-use concession scheme, the agricultural concessionaire would only be assured the right to use the land for a certain period of time, subject to compliance with commitments and burdens associated with the granting of the concession. At the end of this period, or in case of noncompliance with the conditions of the grant, the land and its improvements would immediately revert to the Public Authority.

In addition, the right-to-use concession also appears to be more appropriate than other alternatives, such as lease and assignment of use, because it assures greater stability to the concessionaire, as well as a resolutory right subject to its being given as collateral (e.g., mortgage) to financial agents. The concession would be transferable by means of a prior authorization to be issued by the Granting Authority, subject to prior evidence of the proposed assignee’s technical, financial, and legal capacity.

From an agribusiness point of view, the concession of the right in rem to use would be granted to companies with a strong presence in the agro-industrial market, known as agricultural flagships, which would ensure the projects’ economic sustainability. In order to maximize the social benefits of projects, these agricultural flagships would be encouraged, as far as possible, to include small farmers in their productive chain, providing them with technical and credit assistance, as well as guaranteeing the purchase of a minimum portion of their production.

This model, based upon integrated agribusiness, would also be facilitated by the concession of the right in rem to use, since concessionaires, as agricultural flagships, could integrate small farmers through a subconcession of the right to use regarding lots in the granted area, authorized beforehand by the Granting Authority.

4.4. The Models

Adopting as assumptions (i) the participation of the private sector in the investments required for the construction and implementation of common irrigation infrastructure, as well as for their operation and maintenance, under a public–private partnership scheme (PPP) (notwithstanding a case-by-case analysis of the feasibility of the common concession or of other schemes better suited to current circumstances), and (ii) the logic of integrated agribusiness as the basis of the new model, three models were identified and are described below in greater detail.

The analysis of the models below will have a more legal, descriptive focus. For an economic analysis of these models, see Part 4 of the present study, “Economic Criteria for the PPP Model in Public Irrigation Perimeters”.

4.4.1. Dual Model: Sponsored PPP combined with CDRU
Under the dual model, based on the unique features of the two activities inherent to the irrigation project, two different bids, coordinated with one another, would be carried out, aiming at two different contracts.

On the one hand, the sponsored concession of public irrigation service would be offered for bidding under a public–private partnership scheme. The criterion for the selection of bids would be the lowest counterpayment among the amounts offered by technically, financially, and legally qualified bidders. Eventually, the sponsored concession could be converted into a common concession in case the winning bidder proposes a counterpayment equal to zero or negative (in the latter case, committing itself to paying a certain amount for the right to develop the common concession).

In either case, the concession should have a term compatible with the volume of investments and the period needed for their amortization, taking into consideration the maximum period of 35 years envisaged in the PPP Act.

As part of their qualification, bidders would be requested to provide evidence of their experience with works of similar size and complexity, as well as in the operation and maintenance of irrigation infrastructure or, at least, in the provision of similar public services.

The concessionaire’s remuneration from the start-up of infrastructure operation and the provision of irrigation service to users, would be based on the sum of the public counterpayment (limited to 70 percent of the total remuneration, except when legally authorized to the contrary—Sec. 10, § 3 of the PPP Act), with tariffs collected from service users.

A counterpayment – due on a monthly basis to the private concessionaire in accordance with the delivery of irrigation services – would be guaranteed by the federal Partnership Guarantor Fund, with the
managing institution—Banco do Brasil—being authorized to liquidate the fund’s assets and honor all payments due to the concessionaire whenever the payment has not been made by the Public Authority in a voluntary and timely manner.

On the other hand, the irrigated perimeter would be divided into agricultural modules or plots of various sizes, based on technical criteria (soil quality, logistics, appropriate crops, suitability for farming, market demand, etc.), thus assuring a plot with a minimum irrigable area (e.g., 500 hectares) that is sufficient to attract agribusiness companies.

Each of the modules or plots within the irrigated perimeter would be offered for bidding under a right-to-use concession scheme (CDRU) to companies whose proven technical capacity and good financial and legal reputation demonstrate their ability to operate effectively in the agribusiness field. The right-to-use concession contract would have a minimum term equivalent to the concession of the public irrigation service, although it may exceed it, considering the lack of legal limitations and the greater volume of investments made in irrigated agriculture and its industrialization.

The Public Irrigation Service Concession Contract, as well as the CDRU, would impose on the parties a commitment to sign a standard contract among themselves for the provision of water and the availability of irrigation infrastructure. The contract would contain detailed stipulations on the tariff scheme, as well as the obligations and rights of the parties. The standardization of this contract is necessary due to the impossibility of real negotiation between the concessionaire that provides the irrigation service and the agricultural flagships, since the service would be provided under a natural monopoly scheme after the selection of the service concessionaire.

The tariff would contain a component calculated in accordance with the area covered by the irrigation service (R$/ha) in order to pay the fixed costs of the irrigation service concessionaire associated with its investments in common infrastructure (K₁ factor) and for operation and maintenance costs (K₂a). It would also contain a variable component based on the volume of water actually consumed, which would capture the variable costs of water collection, energy for pumping, etc. (K₂b).

Thus, even if the agricultural concessionaire delays the implementation of cultivation, it would be subject to the payment of the tariff components associated with the extension of the irrigated area served by the irrigation service, as long as the service is being provided or made available. The tariff associated with the volume of water actually consumed would also encourage the rational use of water.

The agricultural flagship, as the holder of the CDRU, would be the party actually responsible for the payment of the tariff to the public service concessionaire. Nevertheless, the flagship would be encouraged to include small farmers in its productive chain through the implementation of sub-CDRUs. The tariff cost of the water paid for by the flagship to provide irrigation to its sub-concessionaires would be deducted from the production price of part of the harvest, whose purchase would be guaranteed by the flagship, according to the integration scheme.
The tariff will tend to reflect the real payment capacity of service users as supply contracts are signed following the bidding process by independent companies that are not related to each other: the public service concessionaire on the one hand, and the agricultural concessionaires on the other.

The disadvantage of the dual model is unquestionably its greater complexity in terms of paperwork, including the need for two bidding processes. As we will see, the need for two bidding processes also raises doubts about the most appropriate bidding sequence. In this regard, one might ask whether it would be more advisable to carry out both bidding processes simultaneously or first the public service bidding and then the bidding for agricultural modules and plots, or vice versa. Let us look at the three possible variations of the dual model.
4.4.1.1 Dual Submodel: Simultaneous Bidding for PPP and CDRUs

Although the public irrigation service and agricultural production within the irrigated perimeter are clearly distinct activities, they are closely related to the extent that one cannot imagine the irrigation service without users or irrigators without irrigation infrastructure and services.

Therefore, in those public irrigation projects that have not yet been implemented, where there are no service providers or irrigators, it may seem logical to carry out simultaneous biddings for both activities. On the other hand, the risks and costs of a separation may only be avoided if the effects of the contract resulting from the first bidding are conditioned to the contract stemming from the second bidding.

Nevertheless, the simultaneous bidding processes for public services (through a PPP) and CDRUs would have the unwanted and double effect of not allowing service concession candidates to know the prospective users beforehand, since they will ultimately be responsible for paying the tariff. Nor will agricultural investors be able to know the concessionaire responsible for the implementation, operation, and maintenance of the irrigation infrastructure on which the success of their crops will depend. This lack of knowledge translates into a greater perception of risk for both groups. It could also inhibit investors interested in both activities from participating in the bidding process or cause them to present more onerous conditions to the Public Authority, as a means of compensating for and “setting a price” on the higher risk perceived.

The risk associated with a lack of knowledge could be mitigated through the association—as long as it is not prohibited by the corresponding bidding announcements or by the bidding law—of public irrigation service candidates and agricultural investors interested in the respective modules. Nevertheless, this would only be a partial mitigation, since the independence of bidding procedures would not guarantee that companies that are related or associated in some way would be simultaneously successful in both competitions.
4.4.1.2 Dual Submodel: PPP Bidding prior to CDRU Bidding

In this variation of the dual model, the PPP bidding would precede the CDRU bidding.

This configuration would have the advantage of allowing the agricultural investor—probably the party most averse to governmental risk—to participate in the bidding for agricultural modules already knowing the company that has been appointed as the concessionaire of the irrigation service and, therefore, the one responsible for carrying out the works and implementing common-use infrastructure.

This prior knowledge would reduce the uncertainties of agricultural investors and increase the attractiveness of CDRUs exactly where a greater volume of investments is expected: on-farm infrastructure, crops, industrialization or processing, and distribution logistics.

On the other hand, greater uncertainty would be imposed on the public irrigation service candidate, who would not have the benefit of knowing its users before the bidding and before signing the concession contract. This uncertainty may be translated into risk and thus lead to a more onerous proposal to the Public Authority in terms of counterpayments.

However, this risk could be mitigated by several factors. First, the fact that the counterpayment could constitute 70 percent of the total remuneration of the service concessionaire reduces the amount and the relative risk associated with the tariff that the irrigators/users will owe. It is also reasonable to suppose that investors with closer links to the irrigation service—in other words, the construction, operation and maintenance of infrastructure—will be more accustomed to dealing with governmental risk, since projects of this nature have a long history of frequent bidding on public works and corresponding contracts with the government.

It would be wise to include detailed requirements for the qualifications of the future agricultural concessionaires (including a copy of the CDRU bidding announcement) in the bidding invitation for the public irrigation service feature, so that the service bidder can at least understand the size and profile of its users.

Finally, under this variation of the model, it would also be advisable that the conditions of the service concession contract, especially the commitment to start the associated works, only become effective and liable upon the successful conclusion of the CDRU bidding. This condition would provide the service concessionaire with the reassurance that it would not be obliged to carry out investments as long as the demand for the services through the granting of CDRUs to the corresponding irrigation farmers remains uncertain.

It should be noted that the optimization of the counterpayment depends on a double assessment mechanism. Based on a projection of the minimum tariff level to be assumed by service users, the public counterpayment would be determined, within the 70 percent limit, as a result of the public service
bidding, thus constituting a fair criterion for selecting the successful bidder (lower counterpayment in addition to the tariff set at a minimum level). In the CDRU bidding, however, this would prevent the possibility of raising the tariff level—with the corresponding reduction in public counterpayment—if all successful bidders express their willingness to pay a tariff higher than the minimum in their bids.

In fact, two possibilities arise in this regard. As a result of the bids, the CDRU bidding announcement could allow different tariffs for each of the agricultural concessionaires, in accordance with their corresponding payment capacities as expressed in their bids. On the other hand, if the adoption of different tariffs is considered inconvenient or legally inappropriate, any difference in excess of the tariff proposed by each of the successful bidders, and that adopted as a general threshold (assuming the leveling by the lowest value), could be converted into a payment to be made by the said successful bidder for the CDRU granted to it (the CDRU bonus). This payment could also be used to reduce the counterpayment or to strengthen guarantees.

4.4.1.3 Dual Submodel: PPP Bidding after CDRU Bidding

Similar to the previous submodel, this variation of the dual model would have the advantage of allowing the irrigation service concessionaire to know what the demand would be, and the identity of the title holders of the CDRUs and users of its services before the bidding. This prior knowledge could contribute to the determination of the counterpayment at the lowest possible threshold as a result of a single judgment under the scope of the service bid, with no need for a double assessment.

This submodel would also have the advantage of making the second bidding (the PPP) unnecessary, if the first bidding, deemed more difficult, is not successful.

A possible disadvantage of this submodel is an increase in the risk of failure of the project as a whole. Although it reduces the risk of public service candidates, this design would also increase the risk of attracting agricultural investors. In theory, this is the project’s greatest challenge, considering the large volume of investments required, the numerous modules or plots to be offered for bidding, and the investors’ greater aversion to governmental risk.
According to the vertical model, a single bidding process would be conducted, granting the winning company—or a consortium of companies—the right to develop irrigation infrastructure and service, and to occupy the irrigated perimeter, either by itself or through third parties of its choosing. In fact, this model would allow for some variations, such as those described below, regardless of others that may be developed case by case, in light of the characteristics of each project.

In submodel 1, a single bidding could grant a company or a consortium of companies the right to build the irrigation infrastructure and to maintain and operate it for the benefit of delivering the irrigation service. It would thus ensure a counterpayment under a PPP scheme and, simultaneously, the right to choose, at its own discretion, the agricultural flagships that would occupy the irrigated perimeter under a CDRU regime, directly granted by the Public Authority, or a sub-CDRU (in this case, the service provider would also be title holder of the CRDU responsible for the sub-concession), leasing, or any other relevant scheme.

Under submodel 2, by adopting the reverse perspective, the single bidding could be responsible for granting the right-to-use concession on the irrigated perimeter to one or more bidders, authorizing them to select the irrigation service provider—responsible for the construction, operation, and maintenance of the common-use infrastructure—at their own discretion. Agricultural concessionaires would also be free to form associations or special purpose entities that would take over the service, as in the case of irrigation districts. If there is a need for public contribution in order to ensure the project’s economic feasibility, the irrigation service provider would be entitled to a counterpayment, under a PPP scheme, that would allow it to provide the service at a cost that is compatible with the payment capacity of agricultural concessionaires.

Finally, under submodel 3, the single bidding would require the participation of consortiums of companies that would bring together members capable of delivering the irrigation service under a PPP
scheme and, at the same time, members who are qualified for agricultural occupation. Despite being a single bidding, it would award two objectives to the winning consortium: the sponsored concession under a PPP scheme of the irrigation service, and the agricultural use of the irrigated perimeter. The winning consortium would be responsible for setting up a special purpose entity for the service and another for the agricultural development of the irrigated perimeter or of each agricultural module. The granting of said objectives to different consortiums or to parties outside of the winning consortium would not be permitted, contrary to submodels 1 and 2.

Any of these submodels would have the advantage of providing investors with greater flexibility, since, to a greater or lesser extent, they would allow for (i) the consolidation of the irrigation service through agricultural occupation within one large company or a vertical consortium of companies; or (ii) free negotiation, under a market scheme, between the irrigation service provider and agricultural producers.

This freedom could be perceived by investors as an indicator of lower risk, since these investors would have control over the selection of their partners, consortium members, and contracted parties, free from new bidding procedures. Guarantees for payments, tariffs (or prices), and implementation or occupation terms would be freely negotiated by the parties, within their sphere of private negotiation. According to economic theory, it would be reasonable to suppose that the parties, rather than the Public Authority and its bidding procedures, would know how to combine their interests in order to maximize the project’s overall efficiency.

Another relevant advantage of the vertical model is the ability to concentrate all the systemic risk in private parties, including a possible breach or default, not subject to regulation, by an agricultural flagship, without the need to appeal to the Public Authority. Under the vertical model, this allocation of risk to the private partner would be feasible and justifiable, since the public service provider and the agricultural flagships in general would be free to broadly negotiate the replacement of a defaulted flagship or another solution capable of assuring the project’s continuity, regardless of any intervention or action by
the Granting Authority. This means that private partners could be made responsible for either the success or failure of the project as a whole.

Under the dual model, since the Public Authority directly grants the CDRUs on one hand, and the concession of the irrigation service on the other, requiring the parties to sign a standard water supply contract, a failure by an agricultural flagship not subject to regulation could eventually force the Granting Authority to intervene in the CDRU, taking it back and offering it for bidding to a replacement flagship. Although several mitigating procedures may be adopted to minimize this residual risk to the Public Authority (e.g., step-in rights conferred to the financial agent or to the service concessionaire, supplementary guarantees, financial reserves, prequalification of intervening parties; etc.), it would be difficult to transfer the full risk to the private partners.

Despite all this, there are several factors to be taken into consideration and weighed with the potential benefits of the vertical model:

(i) First, there is a potential reduction in competitiveness and equality in bidding procedures.

Under submodel 1, for example, mere construction companies or public service providers could not participate, but rather companies that, in addition to these duties, could assume responsibility for the business role—close to that of a corporation—of attracting agricultural flagships, negotiating long-term contracts with them, and inspecting their agricultural occupation. These requirements would certainly reduce the universe of companies capable of participating in the bidding, since they would need to be larger and more sophisticated. In addition, the flagships would not be guaranteed an equitable selection process that would allow them to take over one or more agricultural plots.

Under submodel 2, the same findings are equally applicable, with one difference: the universe of candidates for CDRUs would be reduced due to the need for larger, more sophisticated flagships, since they would be required to assume certain risks associated with the implementation and operation of common-use infrastructure. In addition, potential irrigation service candidates would suffer from a possible lack of equal treatment, due to the absence of objective selection rules in a private selection process.

Likewise, under submodel 3, only a small group of companies capable of setting up consortiums and bringing together such dissimilar qualifications as agricultural development and large-scale civil works construction would be able to take part in the bidding process.

(ii) Second, there is a risk of incompatibility between the objective of the single bidding under the vertical model and the objective that may arise through a PPP, under the terms of the PPP Act.

In fact, the objective of the PPP must be a service, whether or not it is preceded by a public work, that is consistent with the public service concession scheme, taking into account the application, albeit in a supplementary manner, of Law 8987/95 in the case of an administrative concession PPP. In the case of a sponsored concession, which appears more consistent with the vertical model, the PPP Act is clear in stating that a sponsored concession “is the concession of public services or public works referred to by Law No. 8987 dated February 13, 1995, when, in addition to the tariff charged to users, it involves a monetary counterpayment by the public partner to the private partner”.

Submodels 1 and 3 would allow not only for the concession of irrigation services, but also for the transfer of an incorporating and/or agricultural activity that is not necessarily a public service or public work.
Finally, the concentration of all risks associated with the irrigation service, with the works that must precede it, and with agricultural development in a single company or consortium of companies could reduce the project’s attractiveness, since it would oblige participating companies to assume risks that are unrelated to their own business, although with flexibility for mitigating them through private arrangements and contracts.

However, it should be noted that the risks and obstacles described herein could be eased or intensified, depending on the characteristics of each project considered (e.g., project size, number of agricultural modules or plots, feasible crops, need for large investments in civil works prior to service delivery, land ownership status, land ownership prior to project implementation or to expropriation, etc.) as well as the specific terms and conditions proposed for the irrigation service and for agricultural development.

For instance, it seems reasonable to conclude that the vertical model would be more suitable for smaller projects such as Pontal, than for larger ones such as Baixio de Irecê.

4.4.3 Administrative PPP

Under the administrative concession PPP model, the irrigation service, through prior specific bidding, would be hired by the Granting Authority, which would be responsible for the full payment of the concessionaire’s remuneration. This commitment would be guaranteed, either fully or partially, by the Partnership Guarantor Fund. Thus, the concessionaire would not be entitled to charge a fee from the service’s end-users at first, since according to the contract the Granting Authority would be the direct client of the service.

Next, the Granting Authority would offer the right-to-use concessions for the agricultural modules or plots for bidding, ensuring access to water, to the common-use infrastructure, and finally to the irrigation service as a right associated with the CDRU. CDRU title holders would assume the commitment of paying for the right to use assured by the CDRU, including the irrigation service, in accordance with the payment capacity of the irrigated crops. Part of the amount owed by the Granting Authority to the irrigation service concessionaire could be paid by means of assignment of receivables held by the Granting Authority vis-à-vis the CDRU title holders, with or without co-obligation for the assignor.

The administrative PPP model would have the advantage of reducing the risk of demand for the irrigation service concessionaire, ensuring the feasibility of the concession, regardless of the success of agricultural occupation, and theoretically allowing for a lower remuneration to the concessionaire due to the reduction...
in uncertainties associated with the activity. In fact, the concessionaire would not have to assume the risk of agricultural occupation, of the existence of flagships willing to pay for the water fee, and of default by agricultural flagships (except, in the latter case, for assignments in payments made to the service concessionaire without any co-obligation by the Granting Authority).

Another advantage is the flexibility that the model would provide in terms of granting CDRUs and periods for agricultural occupation. Under the dual model, based on the sponsored concession concept, the concession of the public service and CDRUs would have to be offered for bidding simultaneously or successively. In the latter case, the effectiveness of the service concession contract would be suspended until the successful execution by all CDRUs, or vice versa, since the feasibility of the irrigation service and all related works would depend on a guarantee regarding the generation of tariff revenues from all the modules that form the irrigated perimeter. Under the administrative PPP model, the service concession contract may be executed, the works may be implemented, and the service may be started even if the Public Authority has not completed the granting of all CDRUs for the irrigated perimeter. In fact, this would provide greater flexibility for a gradual implementation of the project, which might allow the Public Authority to obtain more favorable conditions throughout the different stages of the project due to its partial implementation and the consequent gradual reduction of uncertainties.

However, the model’s disadvantage would be that it concentrates too many risks under the Public Authority, which has been identified as one of the reasons for failure in the traditional model of public irrigation projects. In fact, the Public Authority would assume responsibility for the full payment of the irrigation service and associated works without any guarantee of the final demand for such service, that is, of the attraction of agricultural flagships capable of efficiently occupying the irrigated perimeter and taking over the irrigation service and its infrastructure.

Finally, the administrative PPP model provides room for legal questioning. According to Section 2, §2, of the PPP Act, “administrative concession is the service delivery contract for which the Public Administration is the direct or indirect user, even if it involves the execution of works or the supply and installation of assets.” In this case, it could be understood that the irrigation service will not have the Public Administration as its direct or indirect user, but rather the farmers, even if the Public Administration contractually holds the position of intermediary. According to this reasoning, the administrative concession in the irrigation sector could be considered a sponsored concession in disguise, thus violating the 70 percent limit for the public counterpayment applicable to the sponsored modality as per Section 10, §3, of the PPP Act.

4.4.4 The first PPP experiences in the Irrigation Sector

Although no PPP agreement had been actually bid for or awarded by the end of 2008, three projects were reasonably advanced in their structuring and preparation studies and may serve as good illustrations of the alternative models discussed above. It should be noted, however, that the description below represented the prevailing models and structures by the end of 2008 and may therefore be altered or adjusted afterwards.

4.4.4.1 Pontal Project (Pernambuco)

The Pontal Project is a public irrigation project located in Brazil’s northeastern Semi-Arid Region, in the State of Pernambuco, within the vicinity of the Petrolina/Juazeiro fruit cultivation hub. It has approximately 8,000 hectares of area that might be cultivated through irrigation (total area in excess of 30,000 hectares). Most of the common-use irrigation infrastructure has already been built and installed by the Government, but there are still some additional works to be completed.
The Pontal Project has been studied by the International Finance Corporation (IFC), under a cooperation agreement with CODEVASF. The IFC has engaged several consultants for the technical, agricultural, and legal aspects and has gathered inputs from public authorities and investors throughout the preparation of the studies.

In comparison with other public irrigation projects, the Pontal Project seemed to present fewer challenges due to its smaller area, advanced stage of infrastructure construction and proximity to a well-established irrigation and fruticulture hub. Accordingly, the Project has been given priority as a pilot PPP project in the irrigation sector. The Pontal Project is expected to attract a reasonable number of investors and will pave the way for new PPP projects in the sector.

Based on its particular features and pursuant to the documents that were submitted to public consultation in 2008, the Project was structured as a sponsored PPP under a vertical/single bidding process approach. The winner of the bidding process will be responsible for setting up a special purpose company to serve as the concessionaire, and to undertake the conclusion of the common infrastructure, its operation and supply of water under a public service regime. At the same time, the concessionaire will be responsible, at its own cost and risk, for securing the occupation of the irrigated area through a private selection regime, subject to certain minimum requirements. Although subject to a public service regime, the terms of the water supply and risk allocation will be freely negotiated with the parties brought to occupy and cultivate the irrigated area.

One of the minimum requirements to be observed in the occupation and cultivation of the irrigated area is the integration of low income family producers into the production chain in at least 25% of the irrigated area. Commitments to effect integration in a larger area of the project will be valued as additional points to the technical proposal, which will have a 35% weight in the overall proposal. The economic proposal criteria (65% weight) is the lowest counterpayment required from the Government.

The bidding selection procedure contemplated the inversion of phases, so that the technical and economic proposals would be assessed and the bidders would be classified accordingly, before the technical, legal, financial, and fiscal qualification requirements are verified. If the first classified bidder satisfies the qualification requirements, there will be no need to assess the qualification of the subsequent bidders, thus saving time and effort for public authorities and reducing the risks of legal disputes related to this qualification procedure.

The bidding selection process also contemplates the possibility of live oral bids in case the difference in points between the first and second classified is less than 20% of the points reached by the first classified bidder.

The public counterpayment, as proposed by the winning bidder (and subject to the cap stipulated in the bidding documents – originally proposed at 208 million reais), shall be payable with consideration for three factors: (i) 10% of the overall counterpayment will be payable in one single installment on the date that the concessionaire completes the common infrastructure works (availability installment); (ii) 40% will be payable monthly within five years to the extent that the irrigated area is occupied (occupation installment), and (iii) the remaining 50% will be payable monthly as of the date that the irrigated area is fully occupied and throughout the contract (performance installment).

The term of the concession is 25 years.

4.4.4.2 Baixio do Irecê Project (Bahia)
The Baixio de Irecê Project is also located in Brazil’s Semi-Arid Region, in the State of Bahia, Municipality of Xique-Xique and surroundings. It presents a potential for irrigated areas in excess of 54,000 hectares and a high quality soil that allows for the cultivation of most fruits and other products. The Government has already implemented a small part of the required common irrigation infrastructure (the so-called first phase), but most of it has yet to be constructed and implemented through an investment of a few hundred million dollars.

In addition to its impressive magnitude, the Project also presents logistical challenges. Located in a completely undeveloped area, it will require long distance transportation to deliver its products to the nearest port terminal in the Port of Salvador. Efficient transportation will require investments in the existing road system or in the multimodal corridor comprised of highways, a segment of the FCA railway concession, and a hydroway. The development of urban villas or the expansion of existing cities will also be necessary to accommodate the working population expected for the Project.

In order to overcome such logistical challenges and the difficulty of occupying and farming such a large irrigated area, agricultural and market studies recommend that a greater part of the Project area be dedicated to a more extensive cultivation that allows for easier and faster occupation, combined with some manufacturing or processing that may add value to the product, such as sugar cane for ethanol production. Such extensive farming would then lead to propitious logistical conditions for the cultivation of more valued crops, such as fruits, for the remaining part.

The Project was originally studied under a PPP approach by an association of investors and consultants in accordance with an authorization from the Ministry of National Integration and CODEVASF and the terms of Section 21 of Law 8987/95, which allows private parties to submit propositions of PPP or concession projects to the Government. In the case that the studies are adopted by the Government, the authors are entitled to be reimbursed for the reasonable and substantiated costs incurred during their preparation, assuming that the author is not the winning bidder him/herself.

In accordance with such studies, and based on the magnitude and challenges encountered, the Project was structured as a sponsored PPP concession under the dual bidding non-vertical approach. The construction, operation and maintenance of the irrigation infrastructure shall be bid for as a public service-sponsored PPP concession for the provision of irrigation services. The remuneration of the concessionaire would include tariffs collected from the producers requesting the irrigation services and a public counterpayment payable by the Government, proportional to the tariff, and subject to the 30%/70% limitation set forth under the Federal PPP Act (i.e., sponsored concessions may not contemplate a counterpayment in excess of 70% of the remuneration of the private party without authorization by law).

Tariffs would include a component based on the availability of the service, calculated in accordance with the size of the plots or areas served by the irrigation service (R$/m2). Another component of the tariff would be based on actual water consumption, calculated in accordance with the volume of water received (R$/m3 of H2O). The first component would therefore cover fixed costs in the construction and operation activities, while the second would remunerate the operational variable cost faced by the concessionaire.

On another front, after the infrastructure concession is awarded and its concessionaire is officially known, the irrigated area, divided into several plots of different sizes and profiles, would be auctioned to agribusiness companies with a proven capacity to pay the water tariffs and to occupy the land. The auction’s selection criteria would not be based on price considerations, but on the willingness of the candidate to pay higher water tariffs, and on certain technical criteria that would include efficiency in the use of the water, level of integration of low income family producers and other factors.
The winning candidates would not become indefinite owners of the land, but holders of a Concession of Right in Rem to Use such land – CDRU for a term of 35 years, which is renewable for the same period. Upon the expiration of such a CDRU term, the land would revert back to the Government to be auctioned again or for other uses.

The term of the concession is 35 years. However, the effectiveness of the commitment of the infrastructure concessionaire to initiate the construction of the required irrigation infrastructure would be subject to a condition precedent that the irrigated area is fully awarded to agricultural investors.

4.4.4.3 Salitre Project (Bahia)

The Salitre Project is a public irrigation project located in the State of Bahia, near the Petrolina fruticulture hub. It has been studied on the same basis as the Baixio de Irecê Project, that is, under an authorization granted by the Ministry of National Integration and CODEVASF and pursuant to the terms of Section 21 of Law 8987/95.

The Project has approximately 30,000 hectares that are suitable for irrigated agriculture, but a substantial part of the area has a less versatile soil that has been successfully tested for sugar cane (as is the case of the neighbor Tourão Project), but does not seem adequate for other crops. Agricultural studies therefore recommend the development of at least two thirds of the project for sugar cane production and only the remaining part for more valuable crops such as irrigated fruits. Most of the irrigation infrastructure has yet to be constructed and implemented, although a first stage has already been built by the Government.

Due to its particular features (e.g., medium size and between the areas of Pontal and the Baixio de Irecê Projects), a hybrid model was proposed. The occupation of two thirds of the Project for sugar cane cultivation and ethanol production would be included, using a vertical approach, as an additional undertaking for the bidder who was awarded with the public service concession for the construction, operation and maintenance of the common infrastructure. It would therefore be up to the concessionaire to procure suitable producers to fully occupy such an area. The plots that are appropriate for fruit production would be auctioned under a separate bidding, after the infrastructure concessionaire is officially known and, therefore, may contribute to enhance the attractiveness of the agricultural perimeter.

5. ECONOMIC CRITERIA FOR THE PPP MODEL IN PUBLIC IRRIGATION PERIMETERS

PPP irrigation projects are rare in this new modality, and the New Conceptual Irrigation Model also differs significantly from the traditional models adopted in the country thus far. Pioneer projects in Chile (Illapel/El Bato and Viejo), which were planned at the end of the 1990s, have not yet been implemented, whereas others, such as Ancoa, Punilla, and Regadío Aconcagua, are still in the portfolio. The Guerdane Project in Morocco, which was intended to be a full concession, ultimately came into being with public contributions through PPP arrangements. A characteristic of irrigated agriculture in PIPs worldwide is that it is not economically feasible if prices reflect the economic cost of irrigation water. In all countries,

either developed or not, water and water resources are heavily subsidized. Thus, experiences confirm that public counterpayment in public irrigation projects is essential.

5.1. The Economic Objectives of PPPs

What would be the justification for governments to invest public resources generated by taxpayers in infrastructure projects that promote private benefits for which users can be charged, and to reduce the ability of these governments to operate in social projects serving populations with no payment capacity?

Public investments in infrastructure projects, especially in developing countries, have always been justified by the economy’s low savings rates, which would require investments using government expenditures financed through compulsory savings, that is, through taxes, or by external savings.

The presence of foreign capital has often been repudiated, thereby reducing the scope of this option, and external savings were often made possible mainly through sovereign loans during times of high international liquidity. Even under more favorable conditions, foreign capital did not enter into such investments, except through joint venture companies, which until then were the existing forms of Public–Private Partnerships.

In many countries without fiscal discipline, these models ultimately depleted the economy’s ability to raise its savings levels when the public debt—linked to the flow of commitments to investments made, together with their low performance, due either to mismanagement or to tariff populism—consumed more and more taxes in order to face the debt service.

After the public investment model was depleted, many countries initiated economic reforms based on privatization or on private concessions. But private capital did not respond in a significant manner to infrastructure services. With long-term investments and heavy sunk costs, investors perceived that the fiscal constraints of these economies would lead to a high volatility in demand, impeding unsustainable growth and thus placing the enterprise’s return at high risk. In addition, many countries were unable to develop a credible regulatory environment (sectoral, normative, environmental, or judicial) that would reduce the regulatory risk of expropriation with requirements for subsidized tariffs, without the corresponding source of financing.

Uncertain demand with sunk costs and/or regulated prices lead more to high losses under negative shocks than to gains under positive shocks. In other words, there is a negative correlation with the investment level and a positive correlation with capital costs. Therefore, investors would have an option value by postponing their investments to times of less uncertainty. In competitive sectors with low sunk costs, however, gains during periods of economic expansion would be higher than losses incurred during recession periods, which would lead to over-investment for capturing such gains when they arise.

Uncertainty about the return on investments leads to an expectation of higher capital remuneration and therefore reduces the investment rate. This is an asymmetrical risk, since losses in case of disaster may be much higher than gains if these do not occur. Consequently, there will be no worthwhile way of insuring against this type of risk. The present status of depletion in infrastructure services in most developing countries that did not overcome their fiscal and regulatory problems is therefore not a surprise.

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33 Sunk costs refer to assets that would only have a trade value within their own sector and therefore, during periods of recession, would tend to have a very low market value, since there would be no buyers. Some sectors feature high fixed costs, such as real estate, IT supplies, vehicles, etc., with a less flexible demand, which are therefore not sunk.

It is in this context that the new PPP version emerges as a remedial tool. Unlike joint venture companies, it is the public sector that invests in private undertakings. The counterpayment of a PPP would be justified when private investments themselves only offer fewer services than those considered optimal from a social standpoint.\footnote{Excellent in those cases where the enterprise’s social return is much higher than the private return, that is, when the collection of services does not cover the costs incurred. This is a rather vague criterion, because there is usually a consumer excess (consumption value higher than the price paid) that would justify any project. Therefore, all projects would be eligible for PPP and there would not be sufficient resources for everyone—we would be back to the difficult issue of ranking projects with higher economic return rates.}

### 5.1.1 Private Management

One of the reasons for PPPs in the United Kingdom was the adoption of private management, which was believed to be more efficient than public management. This motivation resulted in the unprecedented experience of concessions for the provision of universal public services financed by the Treasury, such as health and prisons, which were called “administrative” in Brazil. This option in the United Kingdom was one of the final stages\footnote{PPPs arose during the conservative government led by John Major.} of the conservative party’s ambitious but revolutionary program to modernize the British economy, a process that was started under the first Thatcher Administration and ultimately inspired a wave of privatizations worldwide.

Economic theory indicates that inefficiency would prevail under public management, the result of weak incentives due to a lack of penalties for unproductive management, since gains and losses are not fully perceived by managers. However, this restriction on incentives would also be present under natural monopolies in which the market’s power is legally guaranteed. There are numerous empirical studies that analyze the differences between public and private performances\footnote{Estache, A.; Perelman, S.; Trujillo, L. Infrastructure Performance and Reform in Developing and Transition Economies: Evidence from a Survey of Productivity Measures. \textit{World Bank Policy Research Working Paper 3514}, February 2005.}. They confirm that private management is without a doubt more productive in sectors where there is competition, but not in monopolized sectors in which efficiency is subject to price incentives and regulatory framework targets, rather than to the nature of management itself. In other words, public or private monopolies would also be inefficient due to a lack of competition, and when efficiency gains occur, they would lack incentives for sharing them with consumers.

Thus, a PPP, which is strictly the objective of a natural monopoly, would have the same performance standard. In these cases, price incentives and targets will be crucial for the undertaking to be carried out with low costs and affordability. Under a PPP with a strict objective, this lack of incentives would be even more perverse because the possibility of a public counterpayment review, through the economic-financial balance provision, could create an additional incentive to moral risk,\footnote{Moral risk is a market fault stemming from the asymmetry in unfavorable information to the regulator that does not observe, for example, the regulated costs and therefore has the incentive of using such private information for its own benefit in order to increase revenues.} since a public partnership balances costs and revenues without impacting the demand through tariff increases, as in the case of private monopolies.

The existence of a credible, transparent regulatory framework that creates incentives for the efficiency of the monopoly segment of the strict-objective PPP is a necessary condition for the undertaking so that it may really reach its economic and social goal. In the case of irrigation, such a monopolistic position is clear in the segment that controls common-use infrastructure and water distribution. The incentives that mitigate these monopolistic inefficiencies must therefore be considered.
5.1.2 Demand Risk

The most outstanding motivation for a strict-objective PPP project in Brazil is the insurance against demand risk. It is often said that many infrastructure projects have expected revenues that are insufficient for covering costs incurred. This demand risk may be the result of the non-realization of the demand as well as of tariff subsidies offered to existing demand.

As previously noted, certain services require high sunk costs. Therefore, with long investment maturation periods, the asymmetrical financial results of the uncertainty regarding the sector’s growth may motivate investors to consider a higher rate of return and, consequently, lower levels of investment or provision through an increase in tariffs. The guarantee of counterpayment for a strict-objective PPP would be essential for complementing the reduction in demand during these recession periods and thus alleviate the flow of revenues and tariffs. Once this asymmetry in results is eliminated, investments will become viable in optimum amounts. In the case of irrigation, this has already been confirmed: there are high sunk costs for strict-objective PPP distribution services. A PPP in this sector is therefore essential for the inclusion of private capital.

Another non-realization of demand is that justified by the mere fact that the project has a sectoral or regional development objective. The costs of subsidized provision are thus expected to be lower than the project’s multiplying effects. In these cases, the payment of the strict-objective PPP would be a less costly development, since it would make a private partnership in investment efforts feasible. The impacts on regional development have become widely evident in irrigation projects in Brazil’s Northeast and Semi-Arid Regions39, and the use of PPPs is also fully justified for these reasons.

On the other hand, care should be taken so that project bidding can occur in a competitive environment for the lowest value of the lowest counterpayment so that public counterpayment may remediate these demand risks and not generate moral risks. The rules for such an adjustment should also include efficiency incentives, as previously discussed.

Another type of justification for PPPs in Public Irrigation Perimeters is their distributive purpose, which is focused on several groups of users when they join the activity: for example, small farmers. An additional form of tariff subsidy may thus be offered, but can turn into another situation of uncertain demand when it is adopted by a regulatory act, with no foreseen source of financing. Any infrastructure service under a natural monopoly scheme applies cross-subsidies in order to make use of inflexible segments of demand. Whenever distributive subsidies are in these segments, possibilities for financing through tariffs are reduced and the undertaking’s economic-financial balance is placed at risk. In the case of irrigation for agribusiness concessionaires (broad-objective PPP), this subsidy will not make any sense and a tariff differentiation between them is not expected to be motivated by distributive reasons.40

Nevertheless, consideration of this situation for those small-scale farmers who are expected to maintain a complementary position to the commercial segment is a plausible option. Therefore, a PPP that will offer services with distributive impacts should explicitly define the size and type of financing for such services and the rules for reviewing this public counterpayment.

PPP projects in Public Irrigation Perimeters differ from conventional PPP projects because, in the case of irrigation, supply and demand is in the contract from the start. In other words, there is a captive, known demand, which differs from conventional PPP projects where the supply of infrastructure services is

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40 The subsidy common to all will be the one for regional development, which justifies the PPP, as previously analyzed.
offered for bidding in accordance with a non-captive demand estimate that is made in the market. In conventional projects, a demand curve must be estimated, while in irrigation projects the bidding process for agricultural parcels directly shows the amounts and prices that infrastructure users are willing to demand.

This difference may be an advantage for reducing uncertainty through the prior knowledge of demand. On the other hand, the best use of this advantage may depend on the sequence of the two biddings.

5.2. Risk Analysis in Irrigation PPP Projects

The traditional irrigation model in Brazil is that of public management in water distribution with the support of users’ associations. Agricultural parcels are granted by means of authorization with distributive emphasis, and the tariffs, which are defined administratively, aim to recover only the operational costs. Investment and water distribution activity risks remain with the government, which sometimes assumes part of the agricultural investments and covers their risks.

Although a high level of subsidies still persists, the proposed model for PPPs in Public Irrigation Perimeters may be considered the opposite of the traditional model in some ways. Under the PPP model, the management of water distribution is private and is granted through bidding based on the criterion of lowest public counterpayment. Agricultural parcels are also offered for bidding according to the same criterion, under a right-to-use concession scheme, with the aim of attracting companies with a strong reputation in agribusiness—flagship companies—and with lower operational and commercial risks. Nevertheless, the model also promotes the inclusion of small farmers with these companies. Tariffs are derived from the bidding process and are readjusted in accordance with pre-established rules. Part of the investments and risks is private and therefore the public contribution will be smaller.

Nevertheless, this new concept of the model—both private and competitive—requires greater fine-tuning regarding decision-making on water supply and demand. In other words, there must be a strong dependence between bids for water distribution service and use, which affects the tariff-setting process, as well as the definition of public counterpayment. If the bidding is initiated by the supply PPP (concessionaire), the counterpayment bids should be considered in comparison with a tariff structure defined in the bidding invitation. If the demand bidding (flagships) is done first, a tariff structure will be set up by the successful bidders, which would guide the bids for public counterpayment in the concessionaire’s PPP bid.

Another possibility would be to consolidate both activities (concessionaire and flagships) under a single PPP bidding, through which the right to distribute and use water would be granted. In this case, the public counterpayment bids would also have to be associated with a tariff structure foreseen in the bidding invitation. This way, three options for modeling may emerge:

1. **Model II–Vertical (VT)**: a single private management for the distribution and agricultural use of water; the concessionaire and flagships carry out integrated activities; public counterpayment is defined directly through a single bidding;

2. **Submodel I(a) Concessionaire–Flagships (CA)**: private management of water distribution carried out separately from private management of water use; concessionaire bidding precedes flagship bidding; tariff structure defined in bidding invitation and public counterpayment defined in concessionaire and flagship bidding invitations;

3. **Submodel I(b) Flagships–Concessionaire (AC)**: private management of water distribution carried out separately from the private management of water use; flagship bidding precedes
concessionaire bidding; tariff structure defined in flagship bidding and public counterpayment in the concessionaire’s strict-objective PPP bidding.

No indication was made regarding a topology that included integrated parties because if they are included directly with the flagships, the levels and controls of considered risks will not be affected, whereas if they participate in bids for parcels, they will be affected in the same manner as flagships. However, the participation of integrated parties generates its own risk, which will be analyzed separately.

The aim of this section is to analyze how the efficiency of production and risk allocation varies for each model. In other words, the number and sequence of bids affects levels of uncertainty and thus generates different tariff and public counterpayment values, with impacts on the projects’ economic efficiency. Considerations are also presented on potential fiscal and distributive impacts. Finally, possible mechanisms to mitigate deficiencies in each model are identified.

5.2.1 Bases and Concepts of the Economic Analysis

The economic analysis of productive efficiency and risk allocation is based on several theoretical assumptions:

- Economic efficiency depends on price signals

Prices should reflect the true scarcity (i.e., economic production costs, including externalities) of the good or service so that its use reflects its economic opportunity cost. Economic agents use these prices to make decisions on the amounts demanded. Price is thus the market’s automatic criterion for allocation. Scarcer goods and services will cost more and will be used only for activities that earn sufficient revenues to pay market prices. By allocating scarce goods and services, the economy’s allocation efficiency increases because these goods and services will be used in activities that generate more income and thus have a greater capacity to maintain employment and investments. But activities that use these resources may not be adopting the most efficient production technique, i.e., they may be using less efficient technologies. In some cases, this technical inefficiency is caused by a sub-optimum production scale which, if it were larger, would reduce average costs through economies of scale. Activities in which the optimum production scale is very significant and higher than the existing demand lead to natural monopolies.

- Monopoly in distribution reduces efficiency

However, the existence of monopolies, whether natural or not, means a market that lacks competitive stimuli and consequently a lack of incentives for efficient management practices, for product expansion, and for tariff reduction. This situation is generally more harmful when the monopolist transacts with a competitive segment and can thus exert his marketing power. There is clearly a need for a credible, transparent, regulatory framework that creates incentives for these monopolies to work efficiently.

- Prices differentiated by the user’s marginal productivity are more efficient

In the case of a public monopoly that does not maximize revenues, but rather the recovery of costs, as expected from a public irrigation service concession, prices should maximize the well-being generated by water consumption, given the restriction that the revenue should equal the needs for financing the marginal cost of service provision and expansion, plus a differentiated installment per user that is proportional to the inverse of each user’s demand elasticity. Therefore, users with less elastic demands would pay more than those with more elastic demands.
The objective of this rule is: (i) not to collect more than what is required for recovering costs, and (ii) that more elastic users, with lower marginal productivity\textsuperscript{41} in the use of water, or less willingness to pay for water, would demand lower prices because they would tend to deviate their demand more in light of positive price variations. This has been the basic rule for the pricing of public assets—the Ramsey rule—considered the criterion for public prices to ensure allocation and technical efficiency, and consisting of a pure application of the pricing criterion, either due to the non-availability of data, or to technical and methodological difficulties.

In practice, regulators determine a cost reference to be recovered and an average tariff that will recover these costs, based on a demand forecast and on the social subsidies required by legislation. Operators select the tariff differentiation in accordance with these subsidies and with overall estimates of the demand elasticity that they observe and that is gauged in comparison with observed revenue results.

It is even more complex to apply these tariff adjustment criteria when there are distributive tariffs. If the tariff structure, motivated by a false equality, adopts tariffs that are differentiated only by their payment capacity, with no relationship to the aforementioned efficiency, non-subsidized users must cover the loss of revenues from subsidized users. When non-subsidized users use water more efficiently than subsidized users, with a higher tariff they would tend to consume less and produce below their potential. In other words, there would be a loss in the efficiency of allocating irrigation water, as users who generate greater added value by volume would reduce their use in favor of those with a lower added value.

The possibility of determining a tariff for each user is often rejected in the regulation of natural monopolies due to the risk of anti-competitive discrimination, i.e., as a pure exercise of market power. Even if it is legally accepted, take-or-pay contracts are used in order to keep variations in consumption levels from affecting the capacity to recover the operator’s fixed costs, i.e. the user will have to face the demand risk.

In practice, the tariff structures of monopoly sectors, not only in irrigation but in others such as electricity and telephone services as well, do not fall under the marginal productivity criterion. The tariff structure usually adopted is a two-part tariff, with a fixed part, independent of consumption, and a second part that varies according to consumption. The fixed component is a mechanism similar to demand contracts, to guarantee minimum revenue to the concessionaire so that he can cover his fixed costs. However, this tariff structure does not make the application of the Ramsey rule unfeasible if this fixed component is differentiated by users.

- Verticalization reduces transaction costs and increases efficiency
- Efficient risk allocation is that which minimizes the cost of remediation

\textsuperscript{41} Marginal productivity is when the profit of an economic activity varies with an additional water unit, other constant inputs and factors being kept equal. Mathematically, it is the partial derivative of the profit function in relation to water input. The entrepreneur would therefore be willing to pay, at a maximum, for the value of this productivity.
Risk generates uncertainty in the flow of revenues and in the costs of an economic activity. A variation in these flows may be either positive or negative and may be asymmetrical as well. In other words, losses due to disaster may be much greater than gains from the non-occurrence of disasters. Uncertainty in the return on investments results in an expectation for a higher capital return rate and thus increases public counterpayment. The efficient allocation of risk must therefore go to the economic agent who controls risk at a lower cost. This cost will be lower when the information to which the agent has access, for risk control purposes, is more complete and therefore less exogenous. Furthermore, risk control is less costly if the losses and gains stemming from the occurrence of risk are more symmetrical. When an agent assumes the risk from another agent, without observing his performance with regard to controlling the risk, an incentive is created for the risk-free agent to relax his control, thus generating a moral risk that in turn increases the possibility of risk.

- Uncertainty increases with sunk costs

Sunk costs are irreversible costs or costs with no residual value due to the high cost of re-use, or because certain assets would only have a trade value within the sector itself. Therefore, if the sector experiences a recession, no buyers would be found. Some sectors have high fixed costs, such as real estate, IT supplies, vehicles, etc., but are economically usable and reversible from one activity to the other. Uncertainties due to market or government risks in activities with high sunk costs\(^\text{42}\) are a reason for risk asymmetry and thus generate higher losses during negative shocks than gains during positive shocks. In other words, a negative correlation with investment levels and a positive correlation with capital cost. Investors would therefore have a higher option value by postponing their investments to less uncertain times.

In competitive sectors with low sunk costs, gains in economic expansion would be greater than losses during recession, thus inducing over-investment in order to capture gains when they arise. In water distribution, the irrigation concessionaire makes investments, nearly all of which are sunk costs, where dams, channels, and pipelines are economically useless for another activity. Farming activities may also demand high sunk costs when they require the establishment of crops or off-farm expenditures, although expenditures incurred with machinery and other items can be reverted to other crops. In any case, agricultural activity tends to be more elastic depending upon current prices and, not surprisingly, is often used to face volatile productive cycles, with periodic crises of surplus supply.

### 5.2.2 Productive Efficiency and Risk in Irrigation PPP Projects

Based on the foregoing assumptions, an economic analysis of the three PPP irrigation models is made, as indicated in the previous section. Efficiency gains, demand risks, activity risks, and regulatory risks are analyzed.

**Efficiency is the main economic and environmental issue**

Chart 4 below highlights the types of efficiency expected from each type of model. Model II TV ensures greater allocative efficiency, since the integration between users and concessionaire 1 tends to maximize profit jointly and therefore to apply prices closer to marginal productivity. Furthermore, verticalization would provide greater flexibility for adjustments to supply and demand. Nevertheless, it should be

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\(^{42}\) It is worth mentioning here that sunk costs are those that are irreversible or with no residual value. One reason may be the high cost of re-use, such as buried pipelines. Another reason could be that certain assets would have a trade value within their own sector and therefore, in a recession, would tend to have a very low value because of lack of interested buyers. Some sectors have high fixed costs, such as real estate, IT supplies, vehicles, etc., but they are economically usable and transferable from one activity to another.
highlighted that in large-scale projects, this composition of activities may reduce the number of bidders, hence the possible gains in efficiency.

By initiating the bidding process with flagship companies, Submodel I(b) FC allows these companies to express their maximum willingness to pay, which assures allocative efficiency. This is not possible under Submodel I(a) CF, in which the concessionaire will not be able to differentiate the average tariff, since it does not know the demand.

The existence of a concession 1 monopoly vis-à-vis a diversified segment of users hampers technical efficiency in the distribution activity under Submodels AC and CA, in which there is no integration of activities.

**Chart 4. Productive efficiency**

<table>
<thead>
<tr>
<th>Efficiency in Use of Water</th>
<th>Vertical</th>
<th>Flagship–Concessionaire</th>
<th>Concessionaire–Flagship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocative (price of water reflects its cost)</td>
<td>High Tariffs decided by the market with private contracts</td>
<td>Intermediate Tariffs decided in the concessionaire bidding announcement</td>
<td>Intermediate-High Tariffs are decided at the beginning of the bidding process for flagship companies without knowing the concessionaire</td>
</tr>
<tr>
<td>Technical (minimization of water cost)</td>
<td>High Price control concentrated on a single economic agent</td>
<td>Intermediate Existence of a monopoly in distribution hampers incentives to productivity</td>
<td>Intermediate Existence of a monopoly in distribution hampers incentives to productivity</td>
</tr>
<tr>
<td>Scale (cost of water decreases with scale increases)</td>
<td>High More flexible for adjustments on commercial scale</td>
<td>Intermediate Less flexible on commercial scale</td>
<td>Intermediate Less flexible on commercial scale</td>
</tr>
</tbody>
</table>

**Demand risk is the key issue in a PPP**

There must be an initial stage of project implementation in all models during which there is surplus water due to the distinct evolution in time of the project’s infrastructure and farming parcels. If infrastructure and agricultural projects are planned jointly, this gap between supply and demand is foreseeable and should not be considered a risk, but rather a cost. Although observable, its precision will contain a certain degree of error that will be smaller if possible obstacles to its execution can be foreseen during the planning process.

If the cost of this gap lies with the concessionaire, a price will be set for it and consequently will increase the value of the required public counterpayment. If this risk is assumed by the government through demand guarantees (take-or-pay, for example), the one offered is lowered but becomes contingent. If the forecasted gap actually occurs as estimated at the time of bidding, the present value of the contingent public counterpayment will be equal to the present value of the fixed one, the price of which is set based on the gap’s uncertainty. Nevertheless, inadequate planning may lead to a greater gap, transforming it into a risk exogenous to the concessionaire or flagship company. It would therefore be more efficient if this risk were public, in order to obtain a contingent—but lower—public counterpayment. The decision to privately allocate the gap risk is thus only justified in order to avoid the fiscal cost of dealing with contingent budgetary commitments.
Note that public irrigation projects differ from other PPPs whose gap is uncertain and therefore the public partner pays for non-realized demand as well as for surplus demand, which is sometimes called “sharing of profits and losses.” The irrigation service bidding invitation must therefore indicate the volumes of supply and demand maladjustment to be expected and the periods of occurrence, specifying the flow of supply to be charged to users, and that which is to be fully reimbursed by the public partner whenever there is a gap.

Another key feature for the concessionaire’s public counterpayment offer is the flagship companies’ willingness to pay for irrigation water. The logic of price-setting for public counterpayment involves estimating the tariff price that can be borne by agricultural users.

Chart 5 analyzes the intensity of these demand risks for each model analyzed. Under Model II–VT these demand characteristics would already be part of the strict-objective PPP, since the bidding participants would seek partnerships that facilitate a balance between water supply and demand, both in the work’s periods of execution and in the amounts of tariffs and public counterpayment. Under Submodel FC, the revelation of these features regarding demand, terms, and tariffs also occurs earlier, at the time of bidding for flagship companies, and thus sets guidelines for the next bidding for a concessionaire in a broad-objective PPP. Under the CF Submodel, in the strict-objective PPP, concessionaires must prepare estimates for these demand features, under conditions of uncertainty. It is therefore plausible to assume that there would be less uncertainty regarding demand during the strict-objective PPP concessionaire bidding under Model II–VT and Submodel FC, leading to a lower public counterpayment amount.

In turn, flagship companies could perceive a service supply risk if they do not know the winning concessionaire because agribusiness entrepreneurs have little experience with public projects and would tend to set a high value on the winning company. This uncertainty tends to be less relevant in the case of strict-objective PPPs, in which the concessionaire is necessarily private, and is associated with the SPE and with the PPP Guarantor Fund. In any case, if this occurs, it will lead to a reduction in the flagsips’ willingness to pay and consequently increase the need for public counterpayment.

It is very difficult to compare the economic magnitude of supply uncertainty under Submodel AC to the demand uncertainty under Submodel CA. For a trend assessment, the importance of gaps and sunk costs must be considered. The uncertainty of demand by the concessionaire—which appears under the CA Submodel—tends to generate greater impact on the public counterpayment than the uncertainty of supply under Submodel CA when:

a) the time adjustment between supply and demand is fine-tuned, that is, significant gaps in supply volumes are frequent and occur over a long period of the project life cycle; and

b) investments with sunk costs in infrastructure are much larger than the sum of sunk costs in agriculture.

**Chart 5. Demand risks**

<table>
<thead>
<tr>
<th>Risks</th>
<th>Vertical</th>
<th>Concessionaire–Flagship</th>
<th>Flagship–Concessionaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Low</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Supply and demand fall</td>
<td>Public contract</td>
<td>Prior knowledge of flagship</td>
</tr>
<tr>
<td></td>
<td>upon the same company</td>
<td>bidding without</td>
<td>companies reduces project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>knowing flagship</td>
<td>revision</td>
</tr>
<tr>
<td></td>
<td></td>
<td>companies may</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>require project</td>
<td></td>
</tr>
</tbody>
</table>
Public contracts increase the perception of activity risk

Chart 6 indicates the intensity of the risks associated with the activity according to model type, such as: (i) implementation of works, (ii) marketing, and (iii) credit, affected by the contract’s public nature. The model type may therefore result in different levels of risk and remediation mechanisms.

First, it should be noted that imbalances between supply and demand, either surpluses or shortfalls, may also be caused by failures in the execution of works, infrastructure, and agricultural production units (APUs). This implementation risk would be lower under a VT model, in which the distribution and use of water by the same company could be adjusted at lower transaction costs. Under two bidding models, however, the public nature of concession contracts would cause possible adjustments to be even stricter because the commercial relationship between two public service concessionaires and contract obligations are defined beforehand on behalf of public interest and transcribed in the bidding invitations, and may clash with litigation issues between the parties.

It is reasonable to assume that this strictness may have much less influence than efficient management. It would therefore be advisable in these cases for the private partner to assume full risk, since any overestimate by the public party would lead to a very strong disincentive to good management of the works.

The PPPs’ advantage in terms of reducing credit risk may be negatively affected by the uncertainty of supply under the AC model and the uncertainty of demand under the CA model, if risk perception by creditors is greater than that of concessionaire 2 or the flagship companies. In these cases, the public counterpayment increase would be the result of the capital cost increase which, although increasing the public counterpayment, would not alter its impact, whether or not it is assured by government. In the case of government credits, this risk could be disregarded for capital rates, but in terms of the economy as a whole, the existence of risk would mean a financial loss for the official bank.

The marketing risk, if flagship companies default, is also inherent to the economic activity. It can be controlled more efficiently when it is carried out privately. But if the public process of user selection is exogenous to the concessionaire, it increases the latter’s uncertainty regarding the marketing risk and reduces its capacity to negotiate with flagship companies that are contractually bound to public service concessions. The public nature of the flagship concessions consequently increases the concessionaire’s risk perception of marketing and raises the amount of the public counterpayment. The uncertainty is even greater and out of the concessionaire’s control under the CA model, when its value is defined before the selection of flagship companies. In this case, it would be advisable to split the risk with the government, which would lead to a lower public counterpayment, although it would be contingent upon the occurrence
of risk. Once again, it would be very difficult to estimate the public portion of default to be covered, although in this case it is reasonable to assume that contractual strictness is a more important factor than good management. In order to avoid moral risk, the public coverage of this risk would be limited by coverage ceilings that reflect a percentage close to that used in other public services.

The commercialization risk also lies with the flagship company when it is strongly dependent on agricultural products. Although the farmer is more apt to foresee these cycles, this forecasting is not always simple and crises of excessive supply are frequent. One means of remediation is to divide the losses from cycles of declining prices with the gains from rising prices.

**Chart 6. Activity risks**

<table>
<thead>
<tr>
<th>Risks</th>
<th>Vertical</th>
<th>Concessionaire–Flagship</th>
<th>Flagship–Concessionaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of civil works</td>
<td>Low Private contracts reduce transaction costs in order to make uses more flexible</td>
<td>Intermediate Public contracts of flagship companies increase transaction costs in order to make uses more flexible</td>
<td>Intermediate Public contracts of flagship companies increase transaction costs in order to make uses more flexible</td>
</tr>
<tr>
<td>Commercial</td>
<td>Low Default is managed within the same company</td>
<td>Intermediate Public selection of flagship companies increases uncertainty</td>
<td>Intermediate Public selection of flagship companies increases uncertainty</td>
</tr>
<tr>
<td>Financial/credit</td>
<td>Low Verticalization reduces credit risk</td>
<td>Intermediate Unknown flagship companies may increase the concessionaire’s credit risk</td>
<td>Intermediate Unknown concessionaire may increase the credit risk for flagship companies</td>
</tr>
</tbody>
</table>

**Regulatory risks require clear rules**

There are risks that are inherent to the development of contractual obligations and to the operation of the activity, which do not differentiate between types of models but will require a clear, credible regulatory framework in order to mitigate its effects. Contractual obligations emphasize environmental and hydrological issues and the integration of small-scale farmers and, in terms of costs, foreign exchange and inflationary risks as well.

a) Environmental risk: An irrigation project’s environmental impacts are caused by the use of water resources, the protection of soils, and the conservation of legal and permanent preservation areas, which are governed by their own regulatory frameworks. Adequate project planning, including environmental licensing prior to the bidding processes, adapting the soil to the technologies applied, together with a tariff system that creates incentives for the efficient use of water, minimizes environmental risks. In the case of a disaster, the consequences of these risks are, by law, private and must be assumed by concessionaires, flagship companies, and farmers.

b) Hydrological risk: Hydrological risk is inherent to irrigation. Water availability is stochastic: it is associated with a probabilistic function. In other words, during certain periods, even with an appropriate tariff and precise measuring, available water may require rationing for purely hydrological reasons. This
would be imposed on the sector by regulatory rules for water resources. In these extreme cases, the use of water by one user excludes its use by another and therefore generates a negative externality, leading to the need to establish an additional criterion for rationing.

Since the concessionaire is aware of the distribution of this risk, its business plans already take it into account and thus it is a private risk. Nevertheless, this will not eliminate the need for rationing in case of scarcity, when the most efficient form of rationing should be the one that allocates the demand for more efficient uses. In this way, the adoption of a water market is recommended to guide water rationing during extreme hydrological events that may periodically take place. Each year, all users would submit indicative bids for rationing fees that they would be willing to pay for, specifying distinct volumes of consumption in case rationing takes place during that period. These bids should contain values above the fee that is currently paid for the maximum of the total contract volume. In the event of rationing, contract volumes would cease to be supplied and a new allocation would be made by decreasing order of the bids made in this virtual market, until the rationed volume is depleted and the water fee to be charged from the user is the one indicated in the virtual market bids.

To further improve the efficiency of allocations, the concessionaire would have to reserve a part of the supply (between 5 and 10 percent) for a spot auction, in order to minimize variations in expectations from the time the bids were submitted. A less complex method of using water markets would be to allow the rental of water between users without involving the concessionaire except as an accountant. Rental from lesser value users to higher value users could take place through monetary exchange and annual water allocation exchange between users to allow the migration of supplies to the highest value user during scarcity. Short-term hydrological scarcity could thus be handled between users through market forces.

Since this refers to a risk that is exogenous to concessionaire 1 and to the flagship companies, if the revenues from rationing are lower than those foreseen in periods without rationing, the difference should be paid by the public partner. When the revenue is higher than the amount foreseen, the additional amount would be distributed to users not contemplated in the rationing, according to the volumes and tariffs declared on the list. If the additional revenue is not sufficient for all compensations, the public partner pays the negative balance. On the other hand, in case there is a positive balance, it will be absorbed by the public partner.

c) Integration risk: The possibility of integrating small farmers has, first of all, a direct and focused distributive objective, with the inclusion of a less capitalized segment that is already active in the region. For some crops, when issues of scale and agricultural technology are compatible, these integrated farmers may even increase the efficiency and stability of the flagship company’s productive system.

Since it is legally possible for this integration to be carried out directly by the flagship companies as a subconcession through private contracts without public intervention, integration risks would be shared by

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43 This rationing, as a last resort, may be imposed by the National Water Agency or even by the River Basin Committee, if such committee is available.
44 It should be noted that if supply management keeps consumption sufficiently below the maximum availability in order not to face such periodic rationing, it would be performing at a non-optimum allocation, since during several periods of non-rationing, users with positive benefits would be excluded. This means that, mathematically speaking, the jam point must be reached in order to provide for optimization.
45 Annually or during technically more advisable periods.
46 A single user may bid for different volumetric quantities with differentiated tariffs, respecting his marginal productivity function.
47 In case a user no longer considers his bid as being advantageous, he loses his right in line and will have to resort to the spot market.
48 Note that the bids under this virtual market will tend to reflect the net revenue sacrificed by each user and therefore an efficient form of compensation.
the interested parties, with rules established by them and with traditional conflict resolution mechanisms, without mediation by the regulator.

If, on the other hand, the integrated parties also participate in a bidding process for parcels to be assigned to them and therefore assume public contracts, their contractual relationship with the flagship companies also becomes more costly, as discussed in the case of flagships with the strict-objective PPP concessionaire. In these cases, the situation may be even more controversial, because the integrated parties will be the subject of distributive policies and consequently favored in situations of risk disaster, such as failure to occupy the parcel, default in paying the tariff, and even noncompliance of the marketed product. In these cases, there is an obvious need to establish clear rules for such a relationship by the bidding invitation in order to ensure that it will function efficiently.

d) Exchange risk: The exchange risk can apparently affect the project’s financial profitability when there are obligations in a foreign currency, but this risk can be easily remedied in the future exchange market. However, devaluation may affect the foreign capital invested economically, even if obligations are duly paid, since the capital basis is strongly depreciated. In these cases, the portion of the tariff that covers the capital return tends to increase in order to maintain a constant rate in foreign currency of that foreign capital. This process occurs naturally in a deregulated environment, and the investor must assess losses and gains in demand. When there is price regulation in natural monopolies, an automatic procedure is established that allows for an equivalent adjustment in the tariffs aligned with the exchange rate in choosing the price index. The exchange rate risk also affects flagship companies that, due to their commercial nature, have strong links with the foreign market and thus their prices are directly influenced by variations in the exchange rate. Since these may be either positive or negative, it is recommended that the remediation also incorporate this symmetry. This issue will be further analyzed in the tariff adjustment section below.

e) Inflationary risk: Inflationary risk is exogenous to the investor and significantly affects the real value of revenues. Therefore, automatic readjustments of tariffs based on price indexes will be necessary. As discussed in detail in the tariff readjustment section, technical efficiency for mitigating inflationary effects should be encouraged.

5.3. Regulatory Framework

Conditions for entry and exit have been analyzed in previous sections, when models, bidding processes, and contractual risks were addressed. The present section will analyze tariff system and governance proposals.

The two-part tariff structure already adopted by the country’s public irrigation projects has a $K_1$ component for covering capital costs and another component, $K_2$, for covering operation and maintenance costs. PPPs would lead to a $K_3$ component regarding public counterpayment. As mentioned earlier, the $K_1$ component is a mechanism similar to demand contracts, intended to ensure a minimum revenue for the concessionaire to cover fixed costs. However, this tariff structure could be more efficient from an allocation standpoint if the Ramsey rule were applied for differentiating $K_1$ per user. In the case of flagship biddings, this differentiation may be observed in the successful bids.

5.3.1 System

The existence of natural monopolies, as in the case of the strict-objective PPP concessionaire, means a market without the stimuli of competition and thus without incentives for efficient management practices, for expanding products, and for tariff reductions. Therefore, such a market requires a regulatory framework which creates mechanisms that indirectly generate these incentives through a tariff policy that
considers not only the concession’s economic-financial balance, but also includes penalties and rewards for decreases or increases in productivity and its distribution to users. Thus, the benefits of the monopolies (such as economies of scale) are also enjoyed by users with greater quality and quantity of services and tariff cost-effectiveness.

The need for a regulatory framework is not only to protect users of concession services. Regulation also means assuring the stability of market operation rules for the concessionaire of this monopolistic right. This stability means regulatory governance with autonomy and without political or corporate interference, enforcing the obligations as well as the rights of concession service operators.

When participating in the bidding for a concession, candidates analyze their investment options in light of the obligations defined in the bidding invitations, which will later be the subject of the concession contracts. Even under a contractual relationship, the fact that there are no general, stable rules does not exempt the concessionaire from always being at risk of exposure to opportunistic political pressure. They may be in the form of additional price restrictions or investment obligations that were not foreseen by the bidding contracts which led to the concessions. The absence of a regulatory framework therefore restricts and raises the prices for investments in the sector.

A regulation that aims to promote well-being should thus guarantee compliance with contracts and the appropriate use of efficiency incentives (including those of optimum scale), the expansion of services (including targets), and tariff cost-effectiveness (including forms of subsidies).

The issues that are relevant to the building of regulatory tools are already well known (regulatory agency autonomy, mechanisms for price reviews, productivity factor, exogenous cost components, rules for access, etc.), but they require a process of adaptation to each case. This should therefore be the focus of a credible regulatory framework and lead to stability and efficiency. Regardless of the administrative configuration selected, what matters are the regulatory tools that will guarantee the benefits of natural monopolies while reducing their risks.

As emphasized at the beginning of the present document, irrigation PPP projects may have two types of operators: the strict-objective PPP concessionaire and the flagship companies (broad objective), which must comply with concession contracts that have predetermined targets and tariffs. The following are justifications for various tariff structure proposals and tariff adjustment rules that take into consideration the previously mentioned risk allocation and the specifics of irrigation PPPs.

First, however, it is important to emphasize the way of measuring and charging for water use. The volumetric measurement of consumption maximizes efficiency in water use. Nevertheless, in the majority of irrigation projects where there are mostly small lots, the marginal cost of measuring consumption is increasing and does not offset the eventual gains in efficiency. In these cases, consumption proxies are used, such as charging per hectare or per crop.

The opposite is true for PPP projects within Public Irrigation Perimeters. Given the high volume of consumption by most irrigation farmers who represent commercial companies, the net benefit of volumetric measurement should be advantageous in terms of efficiency and because it is of interest from a commercial standpoint, by allowing a more efficient combination of supply and demand. Among small-scale farmers, volumetric measuring may certainly not be the most efficient, but it will be necessary if this segment receives a subsidized volume cap. In conclusion, volumetric measuring of water consumption is recommended, although the tariff regulation proposed below is appropriate for any other less precise measuring mechanism.

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49 Technical efficiency.
As previously discussed, the initial tariff level will be defined in the bidding process, a mechanism that is used to create incentives for the successful bid to be the one with the best tariff and public counterpayment for the quality and quantity stated in the bid. The tariff levels agreed upon in the bidding process, however, may have to be periodically reviewed, aiming at the economic-financial balance of services in light of changes in the economic and technological scenario. In the meantime, annual readjustments will have to be made in order to follow variations in costs affected by the analyzed risks. These readjustments should avoid the simple transfer of costs and include incentives that encourage productive efficiency and the transfer of part of these efficiency gains to tariff reductions.

An option that was used frequently for annual adjustments is the simple transfer of costs incurred (rate of return). These readjustments are generally estimated based on the full variation of average operating costs and on the maintenance of a previously defined average rate of capital return.

An alternative form, widely used by regulated sectors, is a price cap. According to this approach, the operator is offered an annual variation of automatic readjustment based on general price indexes. From this annual variation, however, a percentage equivalent to an X productivity factor, previously defined by the regulator and to be achieved annually, is subtracted. But a Y factor, also previously defined, is added as well, establishing rules for the transfer of exogenous costs to the operator (or a compensation for early achievement of targets), and thus replicates the cost transfer system. Periodically, usually every five years, the regulator reviews these price cap parameters and factors through consulting studies and public hearings.

There is a vast amount of literature available on experiences with these approaches. One of the conclusions reached is that the rate-of-return system, besides promoting capital-intensive technologies, does not foster tariff cost-effectiveness and technical efficiency, since the costs are fully transferable. In addition, its implementation involves the regulator’s main problem: not knowing the cost structure of the regulated entities. On the other hand, the price-cap system assumes the imbalance of information between the regulator and the regulated parties and thus does not observe the operator’s efforts to promote greater efficiency. It proposes a distribution of efficiency gains between the operator and the users, thereby allowing for tariff cost-effectiveness by requiring an X productivity factor, while at the same time creating a solid incentive for efficiency, since all cost reduction gains, in addition to the X factor, remain with the operator.

Although the price-cap approach appears simpler at first sight, since it eliminates the cost increase estimate, economic literature also recognizes that both systems face similar complexities in their implementation, precisely due to the calculation of the X and Y factors. In the case of PPP projects within Public Irrigation Perimeters, there is an obvious need to create incentives for efficiency in water use in the tariff system in order to avoid environmental problems and increase the added value of investments. A proposal with incentives from the price-cap system is presented below.

50 The theoretically complete form of price cap is more complex and proposes a menu of X and Y factors, from which the concessionaire may choose the one that is most appropriate for its profile, thus minimizing income extraction from a single factor system. Applications of this type are still rare and incipient. See Joskow (2005).


In PPP projects, the mere application of readjustment systems is more complex, since there is a two-part revenue. One part consists of public counterpayment and the other consists of private revenue. In principle, these two parts make up the whole. Concessionaire 1, when making an offer for the public counterpayment amount, bases its calculations on the difference between the cost recovery tariff and the expectations regarding the flagship companies’ willingness to pay. These companies, in turn, make an offer based on the difference between the bidding invitation tariff and water productivity expectations in their activities. Then, once cost recovery or water productivity expectations have been changed, the two parts should be adjusted accordingly.

However, as previously analyzed, project risks are not allocated the same way between concessionaires and the Public Authority. Although the monetary variation and the X factor are applied to both parts of the revenue, the Y factor may be differentiated between them.

A second source of complexity, specific to Irrigation PPP projects, is the complementary nature of the cost recovery expectations of the strict-objective PPP concessionaire with the productivity expectations of the flagship companies and the differences in risk allocation among them. Since the purpose of public counterpayment is to facilitate agricultural projects, these differences must be made compatible. The following proposal is designed with a separation between supply and demand, as they will occur under the AC and CA submodels of both bidding procedures (Model I). It is equally applicable to Model II (Vertical) and only requires excluding the correction for user default, which will be part of the concessionaire under Model II (VT) and thus will have no effect on public counterpayment.

As analyzed below, readjustment and tariff review processes are complex. This complexity increases as maladjustments between supply and demand grow in intensity and frequency and the rules for their resolution are not sufficiently clear and do not include compatible incentive mechanisms, or do not lack good governance by the regulatory agency. The tariff rule calls for periodic reviews to adjust the economic-financial balance, and automatic annual readjustments in the years between reviews.

The low level of dynamics in irrigation technology does not justify a review effort during intervals similar to those adopted in other regulated sectors. On the other hand, investments in the sector (both in infrastructure and in agriculture) have a much longer implementation period, sometimes as long as 10 to 15 years, and this may justify shorter reviews. Once again, the incentive provided by the revision period must be weighed. Shorter terms encourage unrealistic bids from a financial standpoint, with the expectation that reviews may correct intentional deviations. Therefore, the suggestion is that the periodic review of concession contracts, in which the contract’s economic-financial balance is reviewed, should not take place in periods of less than five years, thus dividing the burden of uncertainty between public and private partners in order to reduce moral risk. In the interim, only annual tariff readjustments will be made, as proposed.

The review process may be based on reference enterprises considered most efficient in terms of both infrastructure and agriculture, and the costs are recalculated based on technical and public analyses. This information may be used for revising the tariffs and the public counterpayment for the new concession period.

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53 Technically speaking, it is the marginal productivity of water that measures the profit in production generated by an additional unit of water input.

54 Note that the tariff and distributive volume ceiling are real costs, commercially unrecovered. Their estimates are therefore based on the offer of counterpayments and do not require a differentiated adjustment.

However, this does not refer to recuperation or compensation stemming from deviations in annual readjustments. The focus in each review period is aimed at the future: excesses in annual readjustments—to low or too high—are part of the risk distribution among partners. This is why the system as such promotes efficiency, since more efficient operators have incentives to appropriate the excesses, while the less efficient are penalized if they do not become more productive.

As mentioned under the CA model, there is greater risk for these maladjustments to take place at the beginning of the concession, increasing the complexity and reducing the tariff review process’s chance for success. In the interim between review periods, annual readjustments are applied, using a price-cap system with the following characteristics:

a) Readjustment of the concessionaire’s private revenue:
   - Irrigation projects are capital-intensive and therefore the share of capital recovery represents a considerable part of the tariff. Electricity costs play a major role in the part associated with operating costs. Tariff adjustments may therefore concentrate on these items. The bidding invitation for the strict-objective PPP concession, based on a reference project considered to be optimized, could indicate the percentage of the total cost for the four types of cost categories on which the annual readjustment would be processed, i.e.: (i) percentage of the CA portion of the cost recovery; (ii) percentage for the electricity (EE) portion; (iii) percentage for the AB portion of environmental expenditure; and (iv) percentage of a DI portion, including the other cost items;
   - For the CA portion, apply the General Market Price Index (IGPM), which would already assimilate a possible Y factor associated with the exchange rate risk and an X factor to be deducted in case there is a reduction in the credit risk;
   - For the AB portion, apply the Consumer Price Index (IPC) as an X factor to be estimated by considering the potential for sustainable exploitation of legal reserve areas;
   - For the DI portion, apply the Consumer Price Index (IPC) without the X and Y factors, since this procedure will increase the relative energy cost, encouraging its replacement with operational rationalization techniques; and
   - The tariff’s total annual readjustment to be charged from users is the weighted average of the indexes of each portion in relation to its percentages in the average tariff.

b) Readjustment of public counterpayment:

1. Apply the average final readjustment of the private revenue described above, with the following Y factors:
   1.1. Y risk of flagship default (not applicable to the vertical model): the bidding invitation would indicate the maximum percentages for transferring default of flagship companies and of the integrated parties to be added to the overall total of the public counterpayment and paid to the concessionaire, with no effect on the tariff paid by users; and
   1.2. Y risk of agricultural demand: transfer of a percentage, to be indicated in the bidding invitation, of the variation (either minus or plus) of each flagship or integrated party. This readjustment, whether positive or negative, of the public counterpayment will be paid to concessionaire 1 as the sum of variations weighted by the participation of each user in total water consumption. This factor’s readjustment percentage for each user will be added or subtracted from the tariff paid by the latter to the concessionaire. The overall variation of the concessionaire’s private revenue will be equal to the sum of the variations in public counterpayment emulated by this factor for each concessionaire.

5.3.2 Governance Structures
Regulatory governance will be more effective if there is a smaller asymmetry of information between the regulator and the regulated entity. That is, the more information the regulator has about the type and performance of the regulated party, the more exempt it will be to apply regulatory principles and norms. The need for exemption requires autonomy in decision-making in order to keep regulatory agencies from being “seized” by the interests of those agents that they should regulate or even by the government itself, through opportunistic and immediate actions. Autonomy is centered, overall, on the mandates of agency directors and on joint decision-making. The technical nature of decision making depends on instruments that encourage transparency in both decision making and accountability to society by the agencies’ managers. Consequently, it also depends on the transparency of actions by the regulated operators.

The greater the competition in the sector, the smaller the need for the regulator to obtain information and to intervene, since the sector itself will reward those who are most efficient through price mechanisms. Intervention by the regulator may be reduced to issues of equity and less to those associated with efficiency incentives. The barriers to the entry and exit of market agents will define the degree of competition in the sector. Natural monopolies will require concession mechanisms and the concession contracts will govern the exit conditions, avoiding losses to continuity in service delivery. In summary, economic regulation requires market arbitration and, for this purpose, there must be ex ante rules on which this action can be based. Moreover, it requires an autonomous budgetary administration and a permanent and stable technical staff with technological expertise, but also with skills in economic and legal issues.

**PPP regulation in Public Irrigation Perimeters**

Federal PPP legislation establishes a commission in the Ministry for Planning and Budget to evaluate the projects originated by the sectors and to regulate the bidding and contracting stage and the commitment limits in light of Law No. 11079/04. The same legal framework transfers project monitoring to sectoral ministries and their regulating agencies. Thus, in the case of Irrigation PPPs, monitoring would be the responsibility of the Ministry of Regional Integration under the present federal framework.

**Regulatory agencies**

Regulatory agencies at the federal level are sector-oriented, considering the scale of the businesses involved, such as telecommunications, gas and oil production, federal highways, and electricity. For monopolistic activities under a state Granting Authority, such as intermunicipal transportation, state highways, gas distribution, and in some cases sanitation, the sectors’ scale compared to the state’s administrative capacity has imposed the creation of multisectoral agencies. Non-specialization can obviously be a limiting factor, but the state experiences, although varied, have confirmed these structures as the most feasible from an administrative point of view. In more developed states—particularly Rio Grande do Sul, São Paulo, Rio de Janeiro, Bahia, Pernambuco, and Ceará—there are structures with increasing technical improvements, in which many of them already act by delegation on behalf of federal agencies, as in the case of electricity distribution.

Considering that PPP projects in Public Irrigation Perimeters will be limited in number and, in some northeastern states, will be located where these regulatory agencies are already functioning—provided there is no insurmountable legal impediment—it seems appropriate to assess the possibility of delegating irrigation regulation to these agencies in greater depth.

The role of an agency is to enforce regulatory rules, not to create them. Therefore, once a clear regulatory framework for PPP projects within Public Irrigation Perimeters has been established, these agencies’ expertise and experience in regulation, together with their administrative autonomy, would guarantee that this regulatory framework is respected and implemented.
6. FINAL REMARKS

6.1 Conclusions

Irrigation in public perimeters is a highly subsidized activity in all countries, including developed ones. As analyzed, the PPP models in Public Irrigation Perimeters being proposed in Brazil aim not only to incorporate the private sector in investments, but also to attract the dynamism of agribusiness activities, which may guarantee the desired social development. The new concept also incorporates small landowners in this new productive system in a complementary and integrated manner. This new model, with commercial bases throughout the entire agribusiness chain, aims to provide financial, economic and social sustainability, and to favor the minimization of risks and the commitment of the public sector.

Nevertheless, there are no PPP projects in Public Irrigation Perimeters functioning anywhere in the world. Furthermore, the PPP projects within Public Irrigation Perimeters in Brazil contract the supply under the strict-objective PPP scheme and the demand under the concession scheme of irrigation legislation and other laws (broad objective). Thus, a PPP project within a Public Irrigation Perimeter permits the simultaneous contracting of supply and demand, which differs from conventional PPP models. Three overall conditions may arise: (i) Single bidding—Vertical Model II (VT); (ii) Concessionaire Service-Flagship Submodel (CA); and (iii) Flagship-Concessionaire Service (AC) Submodel.

The analysis of productive efficiency allocation indicates that there are significant advantages and efficiency gains under the vertical model. The same is true for risk incidence. By demanding broad coordination among project designers, builders and agribusiness entrepreneurs, the vertical model may result in a low level of participation by bidders in the bidding process, as in the case of large-scale projects.

Under the two bidding models, for example, it is essential to estimate in which sequence the uncertainty in demand causes greater impact. It is therefore necessary to assess the frequency and magnitude of inherent maladjustments between supply and demand for each project and especially to compare the sunk-cost levels of concessionaire 1 and of the flagship companies.

Since these maladjustments affect the already sensitive financial feasibility of irrigation, as demonstrated, expanding them also increases the risk of the activity in terms of implementation, commercialization, and credit.56

Although the regulatory risks are not differentiated according to model type, they are equally important. Environmental and hydrological issues require additional efforts and mechanisms for their reduction. The integration of small-scale farmers matters, either jointly or separately from the flagship companies. Exchange risks and inflationary risks require a clear, stable tariff scheme.

A regulatory framework is proposed in the sense that risks are allocated and productivity incentives are included in tariff and public counterpayment reviews and readjustment mechanisms.

Governance options are even more complex and undefined. If the establishment of a new entity at the federal level is not applicable, the options of structures already existing under the scope of the Ministry of National Integration and of the Federation’s units are analyzed. The use of state multisectoral regulatory agencies emerges as an option that merits detailed study.

6.2 Recommendations

Some fundamental and structural issues still need to be carefully considered for the successful implementation of this new irrigation model including:

I. Approval of the Irrigation Bill and Reformulation of the National Irrigation Policy

With specific regard to the irrigation sector, we feel that it is both advisable and useful to approve Bill 6.381 (“Irrigation Bill”). This bill is currently being submitted to the House of Representatives and has already been approved by the Federal Senate (PL 229), which intends to reformulate the National Irrigation Policy, revoking Law No 6662 dated 6-25-1979 (“Irrigation Act”).

Although adjustments and additional improvements may be made to the aforementioned Irrigation Bill, the National Irrigation Policy will certainly benefit from a reformulation, in light of the current situation. Furthermore, although the Irrigation Act currently in effect does not prohibit or hinder the implementation of PPPs in Public Irrigation Projects, the Irrigation Bill is without a doubt more favorable to and consistent with this purpose. It also expressly views the PPPs as a tool to implement projects in the sector.

II. Consolidation of the Regulatory Framework and of Public–Private Partnerships

In regulatory terms, the legal and regulatory framework of PPPs at the federal level, which began with Law 11079 dated 12-30-2004 (“PPP Act”), is now largely complete, although ongoing adjustments and improvements may and should be promoted.

In compliance with Section 25 of the PPP Act, the National Treasury Secretariat issued Administrative Rule 614 dated 8-21-2006, stipulating general rules regarding the consolidation of public accounts applicable to PPP contracts. Added to the rules already issued by the Executive Authority, National Monetary Council, Real Estate Value Commission, and Ministry of Finance on the matter of the partnership management agency and the formation and administration of the Guarantor Fund, it is clear that the implementation and granting of the first federal PPPs no longer depend on any other legal, regulating, or regulatory act, except for specific approvals under the scope of each project proposed.

57 In this regard, refer to Decree 5.835 dated 3-4-2005, which creates the PPP Management Committee; Decree 5.411 dated 4-6-2005, which authorizes the transfer of Federal Government stocks in the capital of state enterprises to the Guarantor Fund; CMN Resolution 3.289 dated 6-3-2005; which requires that the PGF be administered by a federally controlled institution that is duly authorized by the CVM to administer securities; CVM Instruction 426 dated 12-28-2005, which governs the rules applicable to the PGF’s administration and to the administering institution; Ministry of Finance Directive 413 dated 12-14-2005, which authorizes the transfer of Banco do Brasil, CVRD, and Eletrobrás shares to the PGF; the PGF Regulations and By-laws approved on 1-27-2006 by the PGF Special Shareholders Meeting.

58 For example, approval of a specific project by the PPP Management Committee, following favorable statements by the Ministry of Planning regarding the project’s merit and by the Ministry of Finance regarding the viability of granting the guarantee and its type (PPP Act, Sec. 14, §3).
Nevertheless, the strengthening of the Federal PPP Program and the effective dissemination of new projects, including those in the irrigation sector, still depend on the consolidation of the aforementioned legal and regulatory framework which, although complete, has not yet been tested following the successful implementation of the first projects. In fact, the successful introduction of PPPs under Brazil’s current conditions requires, first and foremost, the consolidation of a new culture that incorporates international best practices in terms of project development and better coordination with the private sector but also breaks with the more traditional administrative culture in Brazil.

The consolidation of the legal and regulatory framework of PPPs, as well as of the culture on which they are based, can thus only be achieved through the careful consolidation of the first projects, so that this legal and regulatory framework can be applied as conceived and successfully tested. It would therefore create favorable precedents for new projects and provide the Public Authority and the private sector with experience and critical mass for the ongoing improvement and expansion of the Federal PPP Program.

III. Granting and Implementation of the First PPP Projects at the Federal Level

The Federal Government has thus far failed to launch and award its first PPP project. The Bahia portion of Highway BR-116/324 was eventually bid for and awarded as a common public concession, despite the fact that it was originally conceived as a PPP. The same outcome prevailed on the north-south railway project, which is now being implemented as a common concession. Accordingly, by the end of 2008, no federal PPP had been opened for bidding. The most advanced federal PPP projects are still the Banco do Brasil/Caixa Econômica Federal Datacenter (in public consultation by the end of 2008) and the Pontal Irrigation Project, both of which were undergoing public consultation by the end of 2008.

It is essential to the credibility of the Federal PPP Program that the first PPP projects proceed successfully, and result in the awarding of the respective concession to the private sector, in full observance of applicable legal, regulatory, and bidding rules. These PPPs must be awarded, performed and tested, showing their potential to offer superior quality and cost-effective services to Brazilian society. Many other projects are in the process of being studied, and it is important that they also proceed without undue delay.

Even more essential to the formation of precedents favorable to the broad dissemination of PPPs in the irrigation sector is the successful implementation of the first public irrigation projects conceived under this scheme, particularly the Pontal Project (in Pernambuco) and the Baixio de Irecê Project (in Bahia). The precedents and experience gained from these projects will doubtless serve to facilitate numerous others, among the many that are awaiting implementation.

IV. Integration and Coordination with State and Local Public Entities

Although the present study has concentrated on federal irrigation projects, the participation of states and municipalities will be of vital importance, not only in relation to potential projects that are clearly in their respective interest and scope, but also federal projects whose success most often also requires actions reserved for these entities, such as complementary infrastructure and local outflow logistics (for example, local roads, access to ports or other distribution channels), adequate fiscal treatment (particularly with regard to the ICMS-State Value Added Tax on Goods and Services), and implementation of agrovilas (agricultural villages) near irrigated perimeters that are far from cities and urban centers, etc.

It is highly recommended that the Federal Government, either directly or through indirect administration (for example, CODEVASF), sign agreements with these state or municipal entities or take other available
measures to ensure the coordination of state interests and actions and the effective facilitation of the respective projects.

V. Independent Regulation of the Irrigation Sector and its Concessions, and Review of the Institutional Role of the Sector’s Public Agents

There was an attempt, through Provisional Measure Nº 437/08, to grant the National Waters Agency (ANA) the power to regulate federal irrigation projects as an independent regulator, including those implemented under the PPP regime, without negatively impacting its previous powers and attributions. However, it was revoked by Provisional Measure No. 439/08 and the effects of this on the regulation of irrigation projects were not elucidated by Congress. As a result, it is unclear whether ANA will be legally able to assume that role.

Under the current legislation, ANA’s regulation over irrigation projects is practically limited to granting permits for impounding water and for the use of the respective water resources, as well as compliance with the requirements and conditions contained in the grant document and in applicable legislation.

In the projects within its area of operation (São Francisco and Parnaíba Valleys) and within the limits of its abilities, CODEVASF currently plays a role similar to that of regulating and inspecting irrigation projects. However, it cannot be considered an independent entity, since it is associated with the Ministry of National Integration and is administered by directors who are appointed and replaceable at any time by the Office of the President of the Republic (Sec. 19 of the company’s statutes, cf. approved by Decree 3.604 dated 9-20-2000, and modified by Decree 4.694 dated 5-12-2003). It is also financially dependent on subsidies from the National Treasury.

Issues not included under the authority of CODEVASF, in light of the law that created the company (Law 6088 dated 7-16-1974) or rules superseding it, or not delegated to it (as authorized by Sec. 4, §2, of Law 6088/74), are attributable to the Ministry of National Integration, acting as the agency responsible for the formulation and conduct of the National Irrigation Policy, under the terms of Law Nº 10683 dated 5-28-2003, which establishes the organization of the Office of the President of the Republic and its Ministers (Sec. 27, XIII, “j”). For example, the setting of the water tariff and its components K_1 and K_2 has been carried out by the Ministry of National Integration through the issuance of Administrative Rules.

Although the absence of an independent regulatory agency does not constitute a fatal obstacle to the implementation of the first PPP projects in the irrigation sector, the wider dissemination and long-term success of these projects will certainly require such a regulatory agency, which should be, if not a short-term objective, then at least a medium-term one.

It should be noted that this difficulty is not exclusive to the irrigation sector. For example, at the time of the Restructuring of the Brazilian Electricity Sector (RESEB) Project in the mid-1990s and the first privatizations in that sector, the Electrical Energy Regulatory Agency (ANEEL) had not yet been created. The sector was thus regulated by a non-independent executive agency, DNAEE. Although not the ideal situation, the delay in instituting ANEEL did not keep the first privatizations from being carried out, nor did it affect the start of the model’s reformulation, which became focused on private initiative and competition in the areas of production and marketing.

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59 “Paragraph 2. In the performance of its duties, CODEVASF may act, as delegated by the relevant agencies, as an agent of the Public Authority, performing the duties of administering and overseeing the rational use of water and soil resources.”
It is both desirable and recommended that the regulation and inspection of the irrigation sector, as well as other sectors of great public interest and/or those that involve public resources such as water or expropriated lands, be carried out by an independent agency for several reasons. First, because the independence of the regulatory agency constitutes an important guarantee of exemption in regulation from the standpoint of the regulated private agency, contributing to greater stability of rules and consequently to a reduction in regulatory risk. This translates into greater attractiveness for the private sector and lower cost for the state in terms of public counterpayment. Independence also helps the regulatory agency not to become involved in conflict situations, which could occur if it were allowed to act simultaneously as regulatory agency, executor, and entrepreneur, and helps to avoid the risk of political interference, thus prioritizing the technical basis for regulatory decisions.

However, a true and effective degree of independence on the part of a regulatory agency assumes not only the exercise of legal authority with technical autonomy, free of subordination, but also with defined mandates that cannot be replaced on a whim. It is also essential that such a regulatory agency be limited to this regulatory and inspection activity, and not act simultaneously as an entrepreneur in the same sector it regulates, at the risk of leaving room for conflicts and consequently to non-exempt, impartial regulation.

The recent evolution of Brazil’s public administration has demonstrated that this degree of independence and impartiality may only be achieved through independent regulatory agencies that are structured as special autonomous entities, such as ANA, ANEEL, or the National Agency for Petroleum, Natural Gas, and Biofuels (ANP), the National Communications Agency (ANATEL), and numerous others.

In the case of the irrigation sector, this objective may be achieved through, among other alternatives, (i) the confirmation of ANA’s power to regulate the sector; (ii) the creation of a new regulatory agency; or (iii) the reformulation of CODEVASF’s duties and institutional role.

In the short term, the expansion of ANA’s powers may be the alternative that is easiest to implement. Because ANA is a special autonomous agency, it would generate two types of benefit for the project:

On the one hand, it would avert the potential controversy over the possibility of transferring its oversight and regulatory functions to a private-type entity (such as a public enterprise).

On the other hand, its status as a special autonomous agency provides ANA with prerogatives that guarantee greater stability and autonomy in its decision making. These include: fixed term for its directors, joint decision making, financial autonomy, and hierarchical independence.

The idea of an independent verification mechanism to objectively gauge the quality of the irrigation service provided and the fulfillment of contractual targets seems to be a recommendable solution, not only because it would not conflict with the prerogatives of the Public Authority (constituting mere support, without any discretionary or decision-making power), but mainly because it would facilitate the necessary regulation and inspection of the concessionaire.

VI. Strengthening and Expansion of the PGF and Other Guarantee Instruments

The Partnership Guarantor Fund (PGF) appears to be a solid, reliable guarantee option, due to the liquidity of the assets transferred to it and the independence of its administrative institution (as a rule, Banco do Brasil), which will be exclusively responsible for honoring the guarantees provided in case of default by the public partner. However, some of its limitations must be taken into account, especially regarding the maximum value of its assets available for guarantees.
In fact, the PPP Act limited the value of the PGF’s assets to R$6 billion, only R$2.9 billion of which were actually included at the time of the approval of the PGF’s Statutes and By-laws in January 2006. Considering the large number of projects that are intended for inclusion in the Federal PPP Program and the fact that, as imposed by law, the PGF cannot guarantee obligations in excess of the market value of its assets (i.e., its leveraging is prohibited), it is very likely that the PGF will be unable to guarantee all monetary commitments assumed by the Public Authority in all these projects. In this case, the Federal Government, through the Shareholder Assembly, will be responsible for prioritizing some projects to the detriment of others, defining a nominal limit of the obligations guaranteed in each project or a maximum percentage of total obligations, or limiting the guarantee to a contractual period that is shorter than the contract’s actual term.

Under any of these hypotheses, once the PGF’s guarantee capacity as originally conceived is depleted, there will be new PPP projects or a portion of the obligations of the first projects that cannot be guaranteed by the instruments currently available. Consequently, the future of PPPs and their dissemination in a greater number of projects, including those in the irrigation sector, will depend on the expansion of the limit originally established by the PGF, which will require prior legal approval or alternative or complementary guarantee instruments such as those described below.

In accordance with Section 18, §2, of the PPP Act, the PGF may provide counter-guarantees to insurers, financial institutions, and international agencies that guarantee the fulfillment of shareholders’ monetary obligations in public–private partnership contracts.

This outlook signals the possibility for international agencies such as the World Bank and its member institutions (International Finance Corporation–IFC; Multilateral Investment Guarantee Agency–MIGA), as well as other multilateral or export development agencies (such as the Inter-American Development Bank–IDB, Overseas Private Investment Corporation–OPIC, etc.) to provide guarantees directly to private partners within the scope of PPPs, taking counter-guarantees from the PGF. This alternative could increase the attractiveness of projects for the private sector, insofar as the guarantee provided by the abovementioned international agencies substantially reduces the perception of risk for their beneficiaries, especially for those less affected by government risk. In addition, the assumption of this government risk by the World Bank, MIGA, or even IFC would be within the normal scope of these institutions’ operations. Hence, such risk could be absorbed at a lower cost and with greater efficiency.

Furthermore, it would theoretically be possible for these agencies to accept guaranteeing a volume of obligations that is higher than the value of counter-guarantees obtained from the PGF since, unlike what occurs with the PGF itself, these agencies are not prohibited from leveraging their credit, provided that the guarantee operation is duly approved in accordance with each institution’s internal rules and policies.

The PPP Act and its regulation also do not prohibit other forms of structuring or combining guarantees. Thus, in addition to the abovementioned alternative, it would be possible to combine the PGF with guarantees provided by these international agencies, so that, for example:

(i) guarantees by international agencies would secure the obligations assumed by the PGF, creating an additional “ballast” on behalf of beneficiaries (it should be noted, however, that this additional “ballast” to the PGF would probably not constitute the best use of such guarantees by international agencies, since the fund’s original “ballast” is not being questioned until now);

(ii) guarantees by multilateral agencies would complement those provided by the PGF in relation to the obligations of the Public Authority under the scope of PPP contracts that exceed the
capacity of the fund or of its assets which, as anticipated, are limited by law to R$6 billion; and

(iii) guarantees by multilateral agencies would complement those provided by the PGF in terms of time frames; for example, so that the PGF can guarantee obligations the first 15 years of the PPP contract, and those of international agencies can guarantee the remaining periods (or vice versa).

The abovementioned guarantees, under the responsibility of international agencies, could take the form of conventional guarantees or insurance, such as political risk insurance.

In any case, the possibility of expanding the PGF guarantee capacity, regardless of any complementary guarantee, will always be possible by means of a new law that authorizes the expansion of its assets to over R$6 billion. Another feature of the PGF that ensures a constant release of part of its assets (and thus the partial restoration of its guarantee capacity) is the fact that, as stipulated by law, its guarantees shall be considered proportionately exonerated as the monetary obligations guaranteed are paid during the normal course of the respective PPP contract (PPP Act, art. 18, §3).

The broader dissemination of PPPs in irrigation projects may also call for the formation of a specific fund for the irrigation sector (or an asset assigned within the PGF for such purpose), so that the assets allocated to this new fund or to the assigned asset are exclusively linked to the guarantee of monetary obligations under the scope of irrigation projects. Government revenues subject to such linkage, under the terms of Section 167 of the Federal Constitution (i.e., revenues not stemming from taxes, including dividends from state companies such as Eletrobrás and attributable to the National Treasury), could be linked to the fund as a means of constantly providing it with new resources, giving weight to the ongoing operation of new projects.

The first steps needed for the reformulation of the Public Irrigation Project implementation model are being taken and the World Bank is proud to contribute to this process. However, it is essential for the success and expansion of the Federal PPP Program, especially in the irrigation sector, that the abovementioned initiatives proceed without further delay, and that additional or complementary guarantee instruments be considered and made available. With specific regard to the irrigation sector, the implementation of an independent regulatory agency is highly advisable with the aim of assuring the long-term success of the respective public–private partnership projects.
**GLOSSARY**

**Administrative Concession.** This is the PPP contract for service rendering under which the Public Administration is the direct or indirect user, even if it involves the execution of construction work or the provision and installation of assets.

**Agribusiness.** This is viewed as the “productive chain,” ranging from input manufacture and on-farm production to processing and consumption. It incorporates support services, research, technical assistance, transportation, marketing, credit, dealers, physical and/or business boards of trade, etc., until the product reaches the consumer. The concept of agribusiness, which is focused on improving processes, is aimed at increasing efficiency in primary production chains, improving effectiveness in logistics/commodity chains or in the life cycle of products, improving chains of custody for compliance with requirements for registrations, licenses, guarantees, and the corresponding conditions to allow traceability for each commodity, and of value chains that are used to show the preferences of consumers/users, in the form of effectiveness.

**Agricultural Production Units (APU).** These are understood as agricultural establishments or irrigated lots that belong to landowners, lessees/sharecroppers, or concessionaires, who plan to carry out agricultural activities through irrigated or rainfed agriculture, aquaculture and/or protected cultivation, plant production (temporary and permanent crops), or animal production (small, medium, and large animals). An APU may or may not be specialized in a set of products/commodities obtained through irrigation in irrigated perimeters, or may use mixed farming that combines crops and livestock. Small-scale family farming is normally practiced in the latter situation or farm model. By obtaining different products, an APU may associate itself with different marketing channels, with destinations and consumer markets that are also diversified. This is a strategy for reducing risks and diversifying incomes.

**Agriculture.** According to the FAO definition, this includes irrigated and rainfed crops, animal raising, fishing and aquaculture, forests and reforestation. Agriculture is the art and science of cultivating land and of producing in aquatic environments.

**Aquaculture.** This is the case of hydroponics or soil-less culture and of fish farming. Both of these agricultural practices have enormous development potential, both in proper water management and in food production, and it is easy to certify their origin and compliance. Integrated projects with multiple uses of water or water resources may optimize the use of aquaculture and maximize results.

**Assignment of Lands.** Defined as a contract by means of which the public administration temporarily and conditionally assigns a piece of land to an individual upon compliance with predetermined requirements (for example, granting of right to use land for specific ends/purposes, conditioned to the achievement of a certain economic goal).

**Benefit-Cost (B/C) Ratio.** The Benefit-Cost (BC) Ratio is estimated by dividing the value of the project’s benefit (Bt) by its costs (Ct), updated at the same discount rate. The BC ratio should be greater than 1.
Border Price. In terms of products from projects, the distances considered are those from primary production and/or those of packing houses, to shipping points, and the respective costs for exportable, importable, and domestic products.

BOT (Build, Operate and Transfer). This is a project development and execution scheme, normally in the infrastructure sector, in which a certain private entity assumes responsibility for the construction and operation of a certain project and agrees to return the corresponding installations to the Public Authority at the end of the concession or authorization period.

Broad Purpose. The broad purpose of PPPs in Public Irrigation Perimeters includes not only the strict objective but also actions and activities related to the installation of on-farm infrastructure, the operation and maintenance of bases or agricultural production unit (APU) and of farmers and other stakeholders, of strategic business units (SBU), and of the respective production and agribusiness chains and/or clusters.

Certification of Compliance. This criterion, internalized by Legislative Decree No 030/1974, resulting from the Agreement with the World Trade Organization, aims to establish processing standards (efficiency) for the commodities produced in the country.

Certification of Origin. This criterion, internalized by Legislative Decree No 030/1974, resulting from the Agreement with the World Trade Organization, aims to establish and certify product standards (efficiency) for commodities produced in the country.

Clusters (Productive Arrangements). These consist of geographically concentrated institutions with strong interlinkages, both horizontal and vertical, that include specialized production companies, input suppliers and service providers, research and development institutions, public agencies and private entities that provide essential support. The essence of cluster development lies in the specialization capacity within regions or localities committed to sustainable rural development. For example, the liaison among various fruit producers and fruits, services and related products, may constitute clusters or “productive arrangements” for fruit production.

Concession Contract. An administrative contract that provides for the terms and conditions applicable to a Public–Private Partnership - as defined by Law No. 11079/2004 - or the common concession addressed by Law No. 8987/95.

Concession of Public Service. Under the scope of PPPs in the irrigation sector, this corresponds to the concession of the public service of operating common infrastructure, preceded by a public work, with the purpose of providing water to irrigators in an adequate, continuous manner.

Concession of Right in Rem to Use (Land). A legal arrangement (“Concessão de Direito Real de Uso” or simply “CDRU”), based on article 7 of Decree-Law /271/67, through which the right in rem to use public land is granted to a private entity. Such right is linked to the purpose indicated in the concession contract. Under the scope of PPPs in the irrigation sector, the Concession of a Right in Rem to Use may be used to grant lands that make up the irrigated perimeter for use by irrigators.

Conversion Factors (CF). These are indexes or values that are estimated and applied to raise market prices to efficiency prices or shadow prices, reflecting opportunity costs.

DBFO (Design, Build, Finance and Operate). This is a scheme for the development and execution of projects, normally in the infrastructure sector, according to which a certain private entity assumes responsibility not only for the construction and operation of a certain project (BOT), but also for its concept and design.
Economic Assessment. This is performed by obtaining important figures on the Net Present Value (NPV) and the Economic Internal Rate of Return (EIRR), gleaned from contrasting the costs and benefits presented in cash flows and in with- and without-project scenarios.

Evaluation of Social Impacts and Environmental Externalities. Besides the economic and financial benefits that result from investments in common-use infrastructure, as in the case of public irrigation perimeters, these projects necessarily generate important externalities for the process of municipal, regional, state, and national development, resulting from social, environmental, and sometimes managerial/organizational benefits. These include: demographic growth, poverty reduction, social indicators (HDI), migrations, and indicators of environmental impacts and/or externalities caused by mitigating actions.

Finalistic–Integrative Actions. These systemic, holistic actions are identified as being essential for agriculture in the future and are unique to the private sector. They represent the objective possibility of interaction between political-strategic and structural factors or frameworks, and productive action. These include: the natural resources base (climate, soil, and water) used in ecological and agrologial processes for economic purposes; the technological factor of production, including supplies and services; and agribusinesses, which encompass all links of the productive chain—from biodiversity to final consumer—and range from primary production to agro-industrial processing, transportation and storage, distribution and delivery. Finalistic–integrative actions are always carried out through the preparation of three types of projects: (i) regional development projects; (ii) commodity production projects; and (iii) farm-level projects in agricultural production units.

Financial Assessment. Compares costs and revenue at market prices and aims to establish whether or not the undertaking as a whole is sustainable. It also verifies whether or not the project, by supplying water demand, can at the same time generate any financial return and eventually contribute to the amortization of the undertaking. At the micro level, it verifies the capacity to generate income for business-scale producers and their families.

Fiscal Assessment. Considered useful for the relative description of revenue collected through various taxes and tariffs. It is not necessarily a part of social and economic assessments.

Flagship Company. A legal entity with acknowledged business capacity which, under the new model, assumes the leadership of integrating producers and aims at improving processes, product quality, and overall supply, and facilitating technical assistance for producers, and the marketing and possible initial or final processing of products. The Flagship Company may assume the Concession of a Real Right to Use Public Lands and grant Subconcessions of Agricultural Production Modules or Units to rural producers, and assume the Concession of Public Services, either alone or jointly.

Internal Rate of Return (IRR). A measure of efficiency that reflects the project’s net benefits in terms of the percentage of yield on disbursements. It is similar to the benefit-cost ratio. The Economic Internal Rate of Return (EIRR) or simply Economic Rate of Return (ERR) in modern terms is used to measure the cash flow composed of economic benefits.

Investment Amortization Tariffs ($K_1$). These are aimed at addressing the amortization of investments made for common-use infrastructure in Public Irrigation Perimeters.

Irrigated Agriculture. Complementing or replacing rainfall schemes, irrigated agriculture is practiced with the use of water- and energy-saving systems, with high yields and great potential for the improvement of processes, as well as the environment, and also includes protected cultivation and
irrigation using natural flooding on the banks of rivers, lagoons, and lakes, conveyed along flat surfaces (tabuleiros) or on reduced soils, for several crops, especially rice.

**Irrigation Management Transfer (IMT).** The FAO/Land and Water Division event, with the cooperation of the Ford Foundation, gave rise to the definition of Irrigation Management Transfer as “the transfer of responsibility and authority for the management of irrigation systems from government agencies to water users’ associations or to another sector or private entity.” IMT may include the transfer of decision-making authority (governance) and may also include the transfer of ownership of off-farm irrigation infrastructure, normally considered as privatization. In addition, IMT may include passing the water use right from the government to users’ associations, or may only refer to the partial transfer of management responsibility to users, such as supplying water, maintaining channels, or paying for services, while the final approval of operation and maintenance (O&M) and of budgets continues to be the duty of the government.

**Larger-Scale Farmers.** The focus of these farmers is market-oriented and they require only clear, stable rules in order to reduce uncertainties and economic risks for production and marketing. They also require conditions that are on a par with other countries. The farmers who already practice this type of activity are in some way included in the relationships that determine the supplier/client linkage in all the agricultural production chains in which they operate.

**Net Present Value (NPV).** This is defined as the economic benefit generated by the project (Bt), minus the project cost (Ct), updated with the discount rate normally used in the market. The net present value must be positive. It measures the economic and financial feasibility of a project in relation to the time preference of money, or of obtaining benefits with and without the project. It measures or evaluates opportunity costs as well, and is also known as the Present Net Social Value (PNSV).

**Partnership Objective.** The partnership’s objective is to provide collective service for the development of irrigation practices in public projects, understood as an agricultural technique aimed at optimizing agricultural production and minimizing risks, particularly climate risks, with the objective of acting as a leverage for sustainable regional development, especially that of Brazil’s Semi-Arid Region.

**Political-Strategic Actions.** These actions guide the development process and are aimed at improving the quality of human life and the environment. They are the responsibility of the State, interacting with society, and their objective is to create a favorable situation for the sustainable development of the region or of priority actions/products. Their mission is to address the interests of society and to create the necessary conditions for the efficient, effective performance of development agents.

**PPP Guarantor Fund (PGF).** This Fund is constituted by law and is formed with financial resources and public allocations. Its objective is to ensure government counterpayments within the framework of PPP contracts.

**Project Financing.** A financial technique focused on the enterprise and based on financial leveraging and on making external financing available, together with financial agents, based on exclusive guarantees or especially those stemming from the project itself and its capacity to generate revenue.

**Protected Cultivation.** Practiced in environments that are totally or partially protected from harsh climatic conditions and from pests and diseases, protected cultivation may entail controlled climate conditions, fertilizer-irrigation, and plant management in solid or liquid environments.

**Public Counterpayment.** The specific counterpayment (‘‘contraprestação pública’’) payable by the Government to the concessionaire of a PPP, in exchange for the contracted services and results delivered.
by the concessionaire, by means of monetary payments, grant of rights, or transfer of public assets not being used for the rendering of a public service.

**Public–Private Partnership (PPP).** The Public–Private Partnership, in its strict sense/objective, is a type of concession contract between the Government and private companies for the development of projects that are considered priorities and in which the economic return is not high enough to encourage purely private investments. The PPP is an arrangement between the public administration and private entities which establishes a legal linkage for the full or partial implementation or management of services, endeavors, and activities of public interest, which will be accountable for the respective financing and execution of the objective. Two types of concession contracts are envisaged: (i) sponsored, i.e., the entrepreneur receives the tariffs paid by users as a return on his investment, plus a public counterpayment by the Government; and (ii) administrative, i.e., the entrepreneur receives only the public counterpayment by the Government because charges of tariffs for services rendered do not apply in this case.\(^60\)

**Quality Management.** This type of strategic management considers the following to be fundamental: social, psychological, environmental, technical, economic, information-related, and political-cultural variables. These form and characterize companies and endeavors, in which user or client satisfaction plays a basic role. It is the sum of efficiency (process), efficacy (product), and effectiveness (client/consumer satisfaction).

**Rainfed Agriculture.** Totally dependent on natural precipitation regimes, principally rainwater, which play or may play a significant role in regulating surface runoff and filtration regimes, which are essential for irrigated agriculture and also reduce direct evaporation.

**Regulatory Agent.** Normally, this is a public or parastatal institution that is in charge of regulating issues and relations between the government and the concessionaire(s) in the implementation of the terms of concession and subconcession contracts. The Regulatory Agent monitors and controls the operational stages/phases of project preparation, of works to implement the PPP Concession, and of administering the transfer of irrigation management.

**Service Concessionaire (Infrastructure Concessionaire or sometimes simply Concessionaire).** This is the special purpose entity (SPE), constituted by a company or a consortium of companies, which assumes, through the concession contract, the performance of public services for the conclusion of hydraulic works and structures, among others, the management of common-use infrastructure, of common areas for environmental preservation, and agribusiness endeavors.

**Shadow Prices.** These prices seek to reflect the real economic value, i.e., the adjustment of market prices to economic prices or shadow prices. To convert domestic prices to international prices, the Conversion Factors (CFs) are used.

**Special Purpose Entity (SPE).** For purposes of Public–Private Partnerships or common concessions, this means an entity incorporated for the sole purpose of signing the concession contract as concessionaire.

**Sponsored Concession.** Refers to the PPP concession of public services or public works, as provided for in Law No. 8987/95, which involves, in addition to the tariff payable by users, a monetary counterpayment to be paid by the public partner to the private partner.

\(^{60}\) Law No. 11,079/04, which institutes general rules for the bidding and contracting of Public–Private Partnerships under the scope of public administration.
**Stakeholders.** Institutions and projects that can affect qualified persons and organizations, normally as the target population, and can be affected by other persons and other organizations.

**Strict Purpose.** The strict objective of the partnership between the public and private sectors (PPP) is that stipulated by Law No 11079/04. Its scope entails providing a public service, including the implementation and/or conclusion of common-use works and installation in Public Irrigation Perimeters (PIP), classified as Group 1 by the Ministry of National Integration (MI), as well as the maintenance and operation of this common-use infrastructure, for the benefit of users of water resources and related services. For PPPs in Public Irrigation Perimeters, the strict objective may, however, address other collective or common-use interests, as in the case of areas, actions, and activities related to environmental issues.

**Structural Actions.** Systemic actions aimed at implementing the development process. They are the government’s responsibility and they interact with the private sector. These actions encompass community organization, stakeholder training, and making available the infrastructure, technologies, and services needed for the development process. Consistent with their systemic nature, structural actions permeate institutions, bringing them together and integrating them, in order to involve the public and private sectors in their implementation.

**Subsistence Farmers.** These farmers subsist mainly through extractive activities—hunting, fishing, or extraction of soil nutrients—which are not replaced or are only partially replaced, and find it difficult to feed their families and themselves. Members of this category are demoralized by the scale of production, by their location, by their low level of education, and by other unfavorable circumstances, and need comprehensive support and full assistance. The farmers and families in this category represent a significant percentage of society whose participation in the formal economy is extremely low or nonexistent.

**Sustainable Development.** This term refers to the rational use and management of the natural resources base, using a revised, adjusted technological approach; to institutional changes that can assure the quality of productive systems and of the environment, and the quality of life of populations; and to meeting the needs of current and future generations. In agriculture, sustainable development preserves plant and animal genetic resources, water, air, and soils, and is technically feasible, economically viable, and socially accepted.

**Transitional Farmers.** Individuals and families with little or no available capital, who often lease land or work as sharecroppers, but who have good practical experience and management potential, are willing to use technology, and are thus determined to remain working in primary production activities.

**Strategic Business Units (SBU).** These are understood as the gathering of APUs around a certain end-product or commodity, constituted as “interest groups” associated with the logistical chain or life cycle of the product. Custody chains are also used at this level of SBU, with all the necessary regulations, specifications and norms, certifications, guarantees/insurance, and conditions of traceability. The Business Plans formed under the strategy of establishing logistical and custody chains are formulated in terms of the analysis and examination of value chains, with all components of prices, costs, opportunities, and benefits/profits.

**Water Tariffs (K₀, K₂,₁ and K₂,₂).** Defined by law and refer to charges for the supply of bulk water (K₀) and the provision of a water resource (water produced) K₂, subdivided into K₂,₁, of the fixed cost, and K₂,₂, of the variable cost. It is also aimed at charging for the costs of managing, operating, and maintaining common-use infrastructure.